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FUTURE OF STEEL CORPORATION.

The United States Steel Corporation is capitalized for $1,400,000,000; and yet at prices lately ruling a controlling interest in it could be purchased for $126,000,000 in cash. Viewed in this light it does not impress one as a monumental undertaking to acquire a controlling interest in the Steel Corporation. Standard Oil interests have been represented as being desirous of controlling the big steel combination. Whether this is so or not is not known—they are credited with being pretty much into everything—but the thing is not impossible. Steel stocks have been the butt of the market for months. When the preferred touched the low level of 49¾ it is reported that the bond conversion syndicate bought 150,000 shares. The syndicate has the exclusive right to convert Steel preferred into bonds. While the preferred was selling around 50 the bonds were selling above 65—or in other words a profit of $15 in each share for the syndicate. The shares at 50 would cost the syndicate $7,500,000 and the bonds at 65 would bring them $9,750,000, or a profit of $2,250,000. But this is not all. The Steel Corporation guarantees a commission of 4 per cent. to the syndicate for its services, which on 150,000 shares of stock would amount to $600,000. Undoubtedly the operations of the syndicate have contributed to the downward trend of prices on Steel preferred, and, of course, the common has declined in sympathy.

But concerning the visible and actual assets of the Steel Corporation they can by no means be affected by the fluctuations of the stock market. No matter how violent these fluctuations may be they will neither increase nor diminish the volume of its raw material which is the real base of the corporation's strength. If there is a profit in any part of the manufacture of steel the corporation makes it, for it pays a profit to no one. Based on the net earnings last year of $133,308,764 there was an apparent profit of $16.26 per ton, the number of tons of steel products finished for sale being 8,197,232. This seems like an excessive profit per ton but it must be remembered that it is divided among all the stages of production from the ore in the ground to the final finished product. Probably it is no more than a ton has to pay when it contributes an individual profit to the owner of the ore lands, to the ship that bears the ore, to the railway that transports, to the furnace that melts and the mill that shapes it. In the case of the Steel Corporation all these various profits are merged.

An officer of the Steel Corporation is reported as saying that the company's finished output has been reduced 15 per cent. This, on the basis of the 1902 production, 8,197,253 tons, would make the present rate of annual output something like 7,000,000 tons—an estimate sufficiently close for the following deductions: How far will this restriction of output in itself eat into the surplus? Calculation of interest, dividend and sinking fund charges for 1903 must allow for the $133,000,000 reduction in preferred stock outstanding, for the reduction in the last common stock dividend, for the interest paid on the new 5s so far as issued, and for the interest of $2,250,000 guaranteed on the Union Steel. Making these allowances, and making the same depreciation appropriations as in 1902, the years total charges, including dividends, would be $97,974,458. On the basis of 7,000,000 tons per annum these charges would require a profit of $13.96 per ton as against the actual average earnings per ton in 1902 of $16.26, an apparent margin of $2.30 per ton. Dividends will be less in 1904 than in 1903 because of the cut in common and the retirement of a great block of the preferred. In fact it is to be surmised that the dividend on common will be suspended altogether, resulting in a saving of $10,000,000 at the present rate of 2 per cent. Then certain operative economies are under way which, it is calculated, will save $20,000,000 in actual expenses of operation for the year. Of course a part of this will be offset by a reduction of prices for its products. But with amalgamation and concentration of similar industries undoubtedly a great deal can be saved. Looking at the outlook in this light the future of the Steel Corporation can be regarded with equanimity. Undoubtedly the Steel Corporation has been managed with extravagance. Wherever one has come in close touch with it he has noted this fact, and if it is true of one department the deduction is natural that it should be true of all; but there is no business in the world that can more speedily shorten sail to weather a gale.

SHIPPING AND SHIP BUILDING ON THE LAKES.

What business in the world is there that is subjected to such ventilation as the business of lake shipping. Every day, year in and year out, a thousand newspapers devote two or three columns to registering its latest angle. Truly publicity beats upon it from a thousand searchlights. There is not a prominent shipper or a prominent vesselman who is not called upon daily by newspaper men and his inmost secrets exhibited in the glare of that white light which is popularly supposed to beat only upon the throne. Is there any other business in the world that could bear such unremitting scrutiny and come out unscathed? The latest little crook and angle is recorded and there comes finally such refinement of knowledge to the newspaper man that he knows more about it than the men who are making their fortunes in it—that is fortunes according to the shipper but the ship owner maintains that he is merely writing his warrant for the poorhouse. Of course both shippers and ship owners are each possessed of the customary amount of human nature which makes one of them a bear and the other a bull. It is human nature for the shipper to depress the market and the ship owner to boost it. They are alternately Jim Dumps and Sunny Jim according to the state of the barometer. It is a mighty interesting business nevertheless—chief of which is its freedom from detail and elaborate bookkeeping. And it is a business, too, of which the future is reasonably assured. There is no reason to believe that this country is going to go backwards. Compared with Europe there are empires still uncultivated. The great northwest is, in a relative sense, unoccupied, but the influx of peoples is now directed to it. It has been pointed out by a competent steel maker that the demand for iron increases in a sort of geometrical progression with the increase in population. More and more will the country need iron and practically every pound must pay a slight tribute to lake shipping. The transportation of iron ore is the stable business of lake commerce and this must, in the natural order of things, continue in an ascending scale. Any interruption can be but temporary and will usually be made up in the transportation of other commodities—as, for instance, notwithstanding a slump in ore this year owing to an unprecedented movement last year, the balance is nearly struck by enormous shipments of coal to the northwest. The great waterway from Duluth to Buffalo, a distance of 996 miles, can never be ignored. It is the current of lowest cost and will always be so. As the northwest fills more coal must go forward and all the diverse manufactured products of the east must be sent there; as the country grows more ore must come down. It is doubtless true that the profits of lake shipping will not be in the future what they have been in the past, reckoned upon capital invested, but the business will retain its advantages over that of the ordinary merchant. And so with ship building. It is on the lakes an industry which is protected both by nature and by congressional enactment, being under the coastwise laws. A fair proportion of existing craft are of wood. They are yearly succumbing to the elements. They must be replaced by the modern steel carrier. No business venture, which is not in its nature a monopoly, can look with complacency as far into the future as the lake ship builder.

TEST OF SUBMARINE BOATS.

In Narragansett bay last week there was an elaborate test to determine the usefulness of submarine boats in naval warfare, the purpose being to see if they were less visible at night than surface boats; if they could be navigated successfully and safely in the dark, and if the playing upon them of numerous searchlights hampered the making of observations from their conning towers. The test partook of the nature of a sham battle, in which Fort Adams and the torpedo station, with strong searchlights and large parties of army and navy officers acting as observers, and the tug Peoria, anchored west of the torpedo station, and using a powerful searchlight, were opposed to the submarine boats Moccasin, Adder and Plunger and the surface boats McKee and Morris and torpedo boat No. 1. Of the six craft afloat the Adder alone lived through the battle, and she succeeded in eluding all the watchers and getting into a position so close to the tug Peoria that she could easily have annihilated her. It was, in fact, a clean cut victory for the Adder, which was in command of Lieut. Frank L. Pinney. On the whole the battle was very exciting to those who participated in it, as the night was dark and under the conditions the powerful searchlights shone with great brilliancy. The watchers at Fort Adams picked up with some little difficulty the submarine boats Moccasin and Plunger, but in vain they searched for the Adder. It was learned that the navigation of submarine boats in the dark was practicable and that the playing upon them of powerful searchlights did not much hamper their officers in running them or making observations from their conning towers fairly well. When the light was not playing upon the boats very good vision could be obtained from the submarines. It was proved that the submarines were less visible in the dark than the surface boats. The submarine boats were run in a half submerged condition.

At the last session of congress Representative Lovering of Massachusetts introduced a bill providing for the retirement of officers and men of the life saving service after a certain number of years, or for disability incurred in line of duty. The bill was very strongly supported in and out of congress, was favorably reported from committee and placed on the calendar, but failed of passage. Mr. Lovering has now introduced a new bill providing three-quarters pay on retirement, and it is now before the house committee on interstate and foreign commerce.

SHIP BUILDING AND SHIPPING IN SCOTLAND.

Glasgow, Nov. 9.—At the beginning of the last month but one of the commercial year the ship building outlook is decidedly depressing. It is very evident that the output of the year will be considerable under that of last year, and the new work coming forward does not fill up the berths vacated in the yards as vessels are put into the water. Yet costs are low enough now, and I should think unremunerative for the ship builder. Contracts are reported at prices which are equal to only £6 per ton, £5.15 per ton and even £5.12.6 per ton, dead weight, although wages now are practically as high as they were in the busy times of 1898-1900, and 30 to 35 per cent. higher than they were in the preceding time of depression. Ship building material is not any lower than it has been for some time, but when American and German plates come on the market we may see the price down to £5 or so. But labor is the chief item of cost in ship building, and builders have been loth to stir up strife by proposing to reduce wages until there is absolute necessity. This week, however, ship builders in the north of England have given notice of a reduction of 5 per cent. in all ship yard wages to come into effect next month. It is not yet known how the men will meet the situation, for which, however, they cannot have been unprepared.

The Scotch output in October was twenty-one vessels of 45,120 tons as compared with thirty vessels of 31,920 tons in September, and with twenty-seven vessels of 49,700 tons in October, 1902. The Clyde output last month was nineteen vessels of 44,700 tons, including two warships for the British navy; a 5,000-ton liner built by Barclay, Curle & Co. for the Union-Castle South African Line; a 2,200-ton steamer built by Scott & Co. for the China Navigation Co.; cargo tramps of 2,500 tons and 3,850 tons built respectively by Rodger & Co. and Connell & Co.; and a number of coasters, fishery steamers, tug steamers, etc. The month's launches brings up the total output for the ten months to 376,375 tons, as compared with 446,270 tons in the corresponding portion of last year.

The new orders booked during October do not exceed about 20,000 tons. They include the following: Caird & Co., Greenock, to build a large passenger steamer for the P. & O. Co.; D. J. Dunlop & Co., Port Glasgow, a cargo and passenger steamer of 2,800 tons and 2,500 I. H. P. for the Union Steamship Co., New Zealand; Charles Connell & Co., a steamer for James Nourse, Ltd., London; John Shearer & Co. and Scott & Sons, each a steamer of 500 tons for a Glasgow owner; Fleming & Ferguson, Paisley, a large dredger for Rio de Janeiro and a powerful tug for the harbor works at Suakim; the Fairfield company, a steam yacht of 600 tons; Ferguson Bros., Port Glasgow, a large dredger for the Mersey Docks & Harbor Board; George Brown & Co., Greenock, a large caisson for Rio de Janeiro; Ritchie, Graham & Milne, a steel caisson for foreign owners.

Shipments of coal from this country to America have not ceased, but what we are shipping now is the usual trade to the Pacific ports. These are habitually made by sailing vessel but at present the steamer Blanefield is loading 5,000 tons of steam coal at Newcastle-on-Tyne for the west coast of South America, and the steamer Membland has been fixed to carry a similar cargo to the same coast. They are the first steamers to sail from the Tyne on this voyage, but if they succeed it is probable that steamers will gradually take this trade from sailing ships. Hitherto it has been very much a monopoly of the sailers. The long voyage round Cape Horn, and the difficulty of securing an adequate supply of bunker coal have deterred the introduction of steamers, and coals out, with nitrate or grain home, have mostly been carried in sailing ships. The chartering of the two steamers mentioned indicates a coming change.

The three battleships to be built by contract under this year's navy program will be of the King Edward VII. class, of which five have already been laid down, namely, the King Edward VII., launched at Devonport in July; the Commonwealth, at Fairfield in May; the Dominion, launched in August; the Hindustan, building at John Brown & Co.'s works at Clydebank, to be launched before this year is out; with the New Zealand, to be launched at Portsmouth in February. The two last-named belong to a program one year later than the three others. Great Britain will then have eight battleships of the same class. Each of the ships is 425 ft. long, 78 ft. beam, and at 26 ft. 9 in. draught displaces 16,350 tons. Their speed is 18½ knots and their armament includes four 12-in. four 9.2-in. and ten 6-in. guns. Many designs made at the admiralty were intended to obtain a greater gun power. There were two main alternative schemes, one to provide eight 9.2-in. guns by mounting a pair instead of a single gun in each secondary barbette at each corner of the citadel, and this arrangement found most favor. The other was to fit one 10-in. gun instead of one 9.2-in. in each of these secondary barbettes. But it has been decided to adopt the general characteristics of the King Edward VII. class, partly to save time, and the specifications will be issued to prospective tenderers soon.

Your readers will be interested to learn that the maiden voyage of the steamer Somerset, built at Clydebank for the Federal Line, from New York to Sydney, was accomplished in fifty days, in spite of a succession of gales and heavy seas.

It should have been stated in last week's issue in the description of Harter's ball joints that they are patented in England and the United States. It was so marked in the drawings but was eliminated in the etchings.

PHILADELPHIA SHIPPING ITEMS.

Philadelphia, Nov. 18.—The torpedo boat Stringham was seized last Friday night by the government, at the Harlan & Hollingsworth yards, Wilmington, to prevent its falling into the hands of creditors of the United States Ship Building Co. Two tugs, manned by government naval officials, quietly plied up Christiani creek, under cover of darkness, unfastened the Stringham from the dock and made for League island. During Saturday the tugs and their "captured" trophy remained "under cover," but when darkness came Saturday they made League island and moored near the dry dock. Admiral Sigsbee at once placed a guard on the torpedo boat with strict orders to prevent all attempts to capture her. He then telephoned the "news" to Washington. The Stringham will be overhauled entirely and put into commission. She was built two years ago, but did not come up to contract requirement in speed. After being in commission for more than a year she was sent back to the Harlan & Hollingsworth works to be brought up to the speed requirement. The Harlan & Hollingsworth Co. affiliated itself with the ship building trust. The Stringham had been paid for in great part by the government, but, as the Harlan & Hollingsworth Co. was a part of the trust, was in a receiver's hands, the boat could not be delivered to the government. E. C. Reed, president of the Harlan & Hollingsworth Co., intimated that the Stringham was delivered to the authorities under a compromise agreement.

So far as now decided the International Mercantile Marine Co. will retain the office of Secretary Parvin in this city and remove the controller's office to New York. President Griscom will have offices in both cities. The strike of the marble setters has held back the work of finishing up quarters in the Land Title building, in which the offices in this city are to be, and it is not known when they will be ready for occupancy. In an interview last week Secretary Parvin said: "So far as I know, no statement of the business of the company for the first six months of its existence will be given out."

Capt. J. C. Sanford, who returned from San Francisco last week, and who has charge of the Delaware river improvements, submitted a suggestion to the secretary of war, Saturday, that a suction dredge of 2,000 cu. yds. capacity be built for the maintenance of the Delaware ship channel. The captain also ordered the transport Sumner to this port from New York. On board the Sumner is 98,000 lbs of electric lighting apparatus, which will be stored at Fort Mifflin, below League island, and which eventually is to be used in equipping government dredgers now being built under Capt. Sanford's supervision.

At Washington on Tuesday last G. M. Bingham introduced in the house the resolutions of Philadelphia councils and numerous civil and commercial organizations, asking congress to authorize the deepening of the channel of the Delaware to 35 ft. and to make an appropriation for the work. The resolutions were referred to the rivers and harbors committee, and when up for hearing various Philadelphia and other river city organizations will urge that the improvement be made. Senators and representatives of many states have assured members of the Trades League that they will support the measure.

At Dialogue's ship yard, Camden, two steel car floats and two steam tugs are on the ways. The steel floats are for the Pennsylvania Railroad Co. and are 330 ft. in length and 38 ft. in width. The tugs have steel hulls and are each 100 ft. long; owner's name withheld. The freight steamer Lewis Luckenbach is still at this yard receiving a few finishing touches.

Capt. Roland F. Quillen of Bethel, Del., will have built for him at the New England Ship Building Co.'s yards, Bath, Me., a four-masted schooner suitable for the requirements of the southern lumber and phosphate rock trade. Her dimensions are 165 ft. keel, 37 ft. beam and 13 ft. depth of hold. The keel will be laid next week and the vessel will be launched in April, fairly completed for sea service. About 1,100 tons dead weight and 600,000 ft. of lumber will be her capacity.

Capt. James C. Sanford was designated last week as one of the United States' representatives on the Permanent International Commission of the Congresses of Navigation.

Morton E. Plant has decided to make an attempt to lift the Cape May cup, which is one of the two taken to England by the Genesta after an unsuccessful effort to capture the America's cup. James Gordon Bennett originally gave the cup as a perpetual challenge trophy for races between Sandy Hook and Cape May. Mr. Plant will enter his schooner yacht Ingomar for the contest and has selected Capt. Charles Barr as skipper for the coming season. The Ingomar will be sent abroad and race for the Cape May cup. Mr. Plant says he will not enter the Ingomar in the proposed transatlantic race for the German emperor's cup, as he thinks the element of luck enters too largely into such contests. Important changes will be made in the Ingomar, which is a center-board yacht. Under English yacht racing rules the center-board feature of construction would compel the Ingomar to give her rival, the Cicely, about 59 seconds a mile. As a keel boat this handicap would be reduced to 16 seconds a mile. The center-board will, therefore, be removed and the keel, most likely, extended. Capt. Barr is taking a deep interest in the coming contest.

Mr. G. Foster Howell has purchased the interest of Mr. David L. Bradley in the American Ship Builder, one of the New York marine weeklies and is now sole proprietor. Mr. Howell promises marked improvement in the Ship Builder. Mr. Bradley has entered the commercial printing and publishing business.

COPPER ON SHIPBOARD.

The investigations of Chief Engineer Diegel of the German navy into the action of sea water on different bronze alloys after prolonged immersion are treated of in the current issue of the Engineering Magazine. Investigations made some time ago with copper alloys containing zinc, tin and aluminum showed that an important influence was exerted by the material with which the sheathing was in contact, there being a distant galvanic action. The relative position of attached metals in the galvanic scale appeared to govern the rate of corrosion, and metals which resisted well when in contact with those which were electro-negative towards them became rapidly corroded when in contact with electro-positive metal. In the latest investigations the question of the purity of the material upon the corrosive action is considered, and the extent to which the presence of impurities retards corrosion is studied. Thus specimens of electrolytic copper, 99.955 per cent. pure, were immersed in sea water, besides pieces of ordinary commercial copper, this latter being 98.98 per cent. pure and containing 0.6 per cent. of arsenic. The pure copper was rapidly corroded, the metal being eaten away fully thirteen times as fast as was the impure specimen. Similar results were obtained up the hulls of the vessels, one sheathed entirely with pure copper and the other with the common material.

Herr Diegel examined the conditions under which copper on ship board is corroded, and in view of the extensive use which is made of copper connections on modern vessels this portion of his investigations is of special importance. Corrosion usually takes place in the inside of pipes, and an examination of pipes which have been in service reveals a variety of effects, thus complicating the determination of the causes. Thus, in some cases, there will be a general pitting over the whole interior surface while in others the corrosion is confined to grooving and cutting in limited portions. Especially is this action found at points where the pipe has been highly heated for the purpose of brazing in flanges or other connections. In general the causes of corrosion in pipes may be sought among the following: Use of a variety of kinds of copper in the original construction; admittance of air into the interior of the pipes; or the production of electrolytic action. A careful analysis of the material of copper pipes which had been in service on a number of ships revealed the following facts: Pure copper is, in general, more rapidly corroded than metal which contains impurities, the ordinary commercial material being acted upon less rapidly than electrolytic copper. The presence of oxide in the copper increases the liability to corrosion. Apparently the presence of arsenic in the copper hastens the corrosive action. So far as the action of air is concerned it operates indirectly by causing the formation of spots of oxide, creating galvanic couples and thus promoting corrosion. The presence of arsenic in such cases appears to retard the corrosion. Electrolytic corrosion, due to the action of stray electric currents, forms a most formidable cause for the weakening of copper pipes, and this should especially be guarded against on shipboard by having all return circuits carefully maintained.

DEATH OF REAR ADMIRAL BEARDSLEE.

Rear Admiral Lester Anthony Beardslee. retired, who died at Augusta, Ga., last week of apoplexy, was born at Little Falls, N. Y., Feb. 1, 1826. He was appointed a midshipman in the navy in 1850 and for four years was attached to the sloop Plymouth in the East Indies and participated in a battle with the Chinese at Shanghai. Returning to this country in the spring of 1855 he entered the naval academy the following October and remained until June, 1856, when he was graduated. After being promoted to a passed-midshipman, June 20, 1856, he was detailed for special service on the steam frigate Merrimac. His promotions to be master and lieutenant followed soon afterward. On July 16, 1863, he was made lieutenant-commander and was attached to the monitor Nantucket. He participated in the attack of the ironclad fleet upon the defenses of Charleston harbor, April 7, 1863, and in the capture of the rebel steamer Florida at Bahia by the United States ship Wachusett. After the Florida's capture Lieut. Com'dr Beardslee was detailed to take the prize to Hampton Roads. From 1867 to 1868 he commanded the steam gunboat Aroostook, and after that, in succession, commanded the steamer Saginaw, of the Pacific squadron, and the steam sloop Lackawanna on the same station. He was commissioned commander June 12,1869. For a year after that he was attached to the hydrographic office at Washington. In 1870 he took the tug Palos to China, the first vessel carrying the stars and stripes to pass through the Suez canal. From May, 1872, to April 1, 1875, he was in command of the Washington navy yard. For the next four years he was a member of the United States board for testing iron, steel and other metals. In 1879-'80 he commanded the Jamestown in Alaskan waters and discovered and named Glacier bay. In November, 1880, Com'dr Beardslee got his captain's commission and with it a leave of absence for two years. He commanded the receiving ship Franklin during 1883 and 1884, when he was transferred to the steam frigate Powhattan. Later he was stationed at the torpedo station and on the receiving ship Vermont. From 1891 to 1894 he commanded the naval station at Port Royal, S. C. On Aug. 24, 1894, he was transferred to the Pacific station. He was made commodore June 27, 1893, and rear admiral March 1, 1895. He continued to command the Pacific station until 1897. It was while in this command that he met in Honolulu the Japanese consul-general to Hawaii and said to him: "Look here. We want you people to keep your hands off this country." It had been reported that Japan would send a warship to the island republic and the consul-general asked the doughty admiral if he should report these words to his government. Admiral Beardslee said: "Do as you like about it; but if you do, say the words were used in the course of a social chat."

Admiral Beardslee was retired by age Feb. 1, 1898. He was at that time the second ranking officer in the navy and president of the examining and retiring boards at Washington. Admiral Beardslee was one of the officers serving under Commodore Perry who participated in the landing at Kurihama, Japan, July 14, 1853, and at the interview of Commodore Perry with the two princes representing the mikado, to which President Fillmore's letter was presented. As one of the survivors he visited Japan in 1900 and advocated the erection of a monument on the site of that historic interview, which was put up by the Japanese and unveiled July 14, 1901. Admiral Beardslee was married in 1863 to Miss Evelyn Small of Little Falls, N. Y. His home in recent years was at Beaufort, S. C.

MERCHANT MARINE OF FRANCE.

From United States Consul Skinner, Marseilles, France.

The French people face much the same problem as that confronting the United States in respect to their merchant marine. Ships are more expensive to build and to operate in France than in almost any other European country, and to overcome these inequalities a policy of direct subsidies to certain of the more important lines, and of premiums based upon services to other lines, has been in force for many years.

On April 7, 1902, the present law was passed, admitting to certain benefits new tonnage, to be limited to 500,000 tons in the case of steam vessels and to 100,000 tons in the case of sailing vessels. The law limited the premium for equipping such ships and for their navigation to 150,000,000 francs ($28,950,000), and the same law limited the premium for the building of such ships to 50,000,000 francs ($9,650,000), the expenditure to be applied to a maximum annual construction of 50,000 tons for steamships and 15,000 tons for sailing vessels. It now appears that ship building has been carried on so actively since the passage of this law that the navigation premium of $28,950,000 has already been absorbed by new constructions, finished or approaching completion, which amount, however, to only 403,679 tons instead of the 600,000 tons contemplated by the law. In consequence of this insufficiency of credit, several of the ship yards are closed entirely, some are running with reduced forces, and the depression which existed in the industry a number of years ago prevails again today. Efforts are being made to obtain a new credit, whereby the total new tonnage may be carried to the 600,000 tons provided for in the law of 1902.

The year 1902, as compared with the previous year, showed an increase of 775,000 tons in the amount of shipping entered and cleared from the various ports of France, but as the tonnage under the French flag shows an actual decrease of 10,000 tons this increase, while great, is unsatisfactory. The unfavorable situation is plainly due to the disastrous strike which occurred in Marseilles in November and December last. Eighty-seven per cent. of the general navigation movement is the proportion open to competition. Under this category the total share of the French flag, which amounted to 21.7 per cent. in 1899, had fallen in 1902 to 19.2 per cent. That the approximately stationary situation of the French merchant marine is not positively worse is attributable to the trade with Algeria and the colonies and protectorates, reserved or restricted largely to French vessels. In a total movement of 4,000,000 tons with these regions foreign flags figure to the extent of only 234,000 tons, and the French flag shows an increase in 1902 of 126,485 tons over the preceding year. This favorable showing has given great encouragement to the friends of colonial development in France. The navigation statistics for France during the year 1902 were as follows:

Flag.	Vessels entered,		Vessels cleared,	
	Number.	Tons.	Number.	Tons.
French	7,617	4,746,694	7,603	4,539,047
Foreign	17,327	13,622,685	13,351	9,196,335
Total	24,944	18,369,379	20,954	13,735,382

The following statement shows the entrances and clearances of vessels at the principal ports of France in 1902:

Port.	Vessels.	Tonnage.
Marseilles	7,862	9,463,872
Havre	3,588	3,909,237
Boulogne	3,609	3,039,965
Cherbourg	2,010	3,030,102
Bordeaux	2,361	1,782,464
Dunkirk	2,408	1,759,258
Calais	3,943	1,415,819
Rouen	1,740	1,069,489
Cette	1,600	937,562

After a number of conferences between naval officials and members of the Harlan & Hollingsworth Co., Wilmington, Del., the torpedo boat Stringham, which the company contracted to build, has been taken to the League Island navy yard. The government has not, as yet, decided what further steps to take with the boat.

SIR WILLIAM WHITE'S ADDRESS.

Upon Election to the Presidency of the British Institution of Civil Engineers, He Reviews Ship Building and Engineering During His Eventful Life—A Special Study of the Great Eastern.

Sir William Henry White has been elected president of the British Institution of Civil Engineers. Probably no living man is more famous as an engineer. It is probably not too much to say of him that he has sensibly influenced the navies of the world and was beyond all question the most popular naval constructor Great Britain ever had. His presidential address was a succinct history of naval architecture. It was very long and only a fragment of it can be given in the present issue but it will undoubtedly be discussed later. Sir William pointed out that during the eighty-five years of its existence no naval architect or ship builder had ever been president of the institution, and, therefore, he was deeply appreciative of the honor which had been conferred upon him. Concerning the scope of his address he said:

"It is my purpose in this address to attempt a review of the progress of ship building and engineering during the forty-five years that have elapsed since I commenced my apprenticeship as a lad of fourteen. The story will deal with things I have personally seen or known, and it is worth telling; but so wide is the range and so eventful the narrative that it is impossible to do it justice. My endeavor, therefore, will be to indicate the great lines of advance and the principal results achieved while not leaving, altogether unnoticed possibilities of the immediate future."

PROGRESS IN SHIP BUILDING AND MARINE ENGINEERING.

Before entering into the subject Sir William digressed a little to note the progress of the institution during its eighty-five years of life, and said:

"Turning to the main subject of this address—progress in ship building and marine engineering since 1859—it is desirable to state briefly what was the position of affairs at the initial date and how it had been reached. In March, 1859, before the Warrior was ordered, my association with ship building began. The royal dock yards were then crowded with men and working overtime to hasten the steam reconstruction. My first employment was on a line-of-battleship, built as a sailing three-decker many years before, which was undergoing conversion into a screw two-decker. During the year I assisted at the "lengthening" of a sailing frigate which was cut into three pieces, the bow and stern portions being drawn apart, and the form modified to receive a screw. I also witnessed the commencement of new line-of-battleships and frigates, which were pushed forward rapidly for a time, then left on the stocks for years, and finally taken to pieces. A more singular illustration of indecision and unproductive expenditure it would be difficult to discover.

"The screw three-deckers built in 1855-59 were splendid specimens of what could be accomplished with wood as the principal material construction, and embodied not merely the accumulated experience of centuries in hulls, rigging, equipment and armament, but that of nearly half a century of marine engineering. The Victoria, launched in November, 1859, was 260 ft. long, 60 ft. broad, had a mean draught of 26 ft. 3 in., and an extreme draught of nearly 28 ft. Her displacement was about 7,000 tons, her engines developed 4,200 H. P., with a corresponding speed of about 12½ knots. She had a full sailing equipment, the sails aggregating 31,000 sq. ft. in area. The funnel could be lowered and the screw could be lifted out of water when the ship was under sail. Her armament consisted of 121 guns, mounted on three gun-decks and an upper deck. All were smooth bores, firing spherical cast-iron projectiles; one was an 8-in. 68-pounder pivot-gun, weighing 95 cwt.; sixty-two were 8-in. shell-guns, weighing 65 cwt., and firing 56-lb. projectiles; and fifty-eight were 32-pounders weighing 56 cwt. All except the pivot-gun were mounted on wooden-truck carriages. How small had been the advance in naval gunnery will be seen from the statement that in the ships of Queen Elizabeth's reign there were guns of 8 in. to 8½ in. caliber, discharging projectiles weighing 60 lbs. to 66 lbs. There were, of course, many features in the later weapons, giving them superiority over the earlier, and the 8-in. shell gun indicated a new departure. But in essentials of guns, mountings and projectiles, there had been no great change in nearly 300 years. The cost of the Victoria was £217,000, nearly one-third of that amount being expended on machinery. It will be interesting to add a few facts as to the largest representative merchant ships of 1859-60. With the advent of iron hulls and steam-power came rapid growth in dimensions of merchant vessels, but they were still inferior to the largest warships in displacement.

"The finest ship in the Cunard fleet in 1859 was the iron paddle-wheel steamer Persia. By the courtesy of the company I have been able to add to the particulars for this notable vessel appearing in various publications. She was 360 ft. long, 45 ft. broad, and 31.5 ft. moulded depth. Her gross register tonnage was 3,300 tons. Her deep load draught leaving port was about 23 ft., with a corresponding displacement of about 6.000 tons; if laden to 24 ft., it would have been about 6,400 tons. Her engines developed 4.000 H. P., and gave her a sea speed of nearly 13 knots; the daily consumption of coal was 150 tons, and she carried 1,600 tons in her bunkers. Her dead-weight capacity for cargo was 1,100 tons, and she had cabin accommodation for 180 passengers. This was the finest transatlantic steamer of that date. Her fastest passages took nine to ten days. She was heavily rigged, and the quicker passages were, no doubt, made with favorable winds.

"The iron screw-steamer Ceylon, owned by the Peninsular & Oriental Co., was in 1859 the finest vessel on the Alexandria mail service; she was 306 ft. long, 41 ft. broad, and nearly 28 ft. deep; 2,000 gross register tonnage; load draught, about 20 ft. Her engine developed about 1,500 H. P., and her sea-speed was 12½ knots to 13 knots; she burnt about 60 tons of coal per day, and carried 11 to 12 days' supply.

"Turning to the Cape service, in 1860 the mails were carried in iron screw-steamers about 180 ft. in length, 25 ft. broad, and 17 ft. deep, having a mean draught of 14 ft. The gross tonnage was 550 tons; horse-power, about 300 to 350; speed, 8½ knots to 9 knots. The Royal Mail Co. were carrying mails and passengers to the West Indies in vessels of 12½ knots to 13½ knots sea-speed. The Atrato was their largest vessel in 1860. She was 336 ft. long, 41 ft. broad, and 33.7 ft. deep, over 3,100 tons gross, drew about 21 ft. when laden, was propelled by paddle-wheels of 2,500 H. P. to 3,000 H. P., and had a speed of 13 knots to 13½ knots.

A SPECIAL RESEARCH REGARDING THE GREAT EASTERN.

"These particulars for representative steamships are of interest as illustrations of the progress made from the real commencement of ocean steam navigation in 1838, and as a means of comparison between the largest and swiftest mail steamers of 1859-60, and the largest screw line-of-battleships of that date. In addition they are of value as an indication of the magnitude of the departure from precedent and experience made by Brunel when he undertook the design of the Great Eastern. That wonderful ship started on her first cruise on Sept. 7, 1859, and the great engineer died on Sept. 19. Fortunately, there remain in the reports and memoranda included in his published life a fairly complete account of the fundamental ideas on which the design of the vessel was based, the manner in which the dimensions were determined, and the structural features decided. At the close of the year 1851 he began to study the problem of constructing a vessel capable of carrying coal sufficient for the voyage to Australia and back—that is, the circumnavigation of the world—in association with the accommodation for a large number of passengers and a reasonable amount of cargo. This subject occupied no small share of his time and thought until the end of 1853, when contracts were signed for the construction of the ship and propelling machinery. Brunel sought advice and assistance in all quarters, and frankly acknowledged his obligations, saying to the directors of the company formed to build the ship: 'I have not hesitated to consult everybody whose opinions I considered valuable, and to bring the result of their opinions in aid of my own and the manufacturers' experience.' But it is clear that all the great features of the design—structure, arrangement of propelling machinery and determination of dimensions—were his own work. He accepted full responsibility and spared no pains to secure success. He said: 'I never embarked on any one thing to which I have so entirely devoted myself, and to which I have devoted so much time, thought and labor, on the success of which I have staked so much reputation, and to which I have so largely committed myself and those who were disposed to place faith in me.' There is ample evidence that this was no exaggerated view of his action. Personally I have been familiar with the facts for many years; but having recently gone again most carefully through Brunel's notes and reports, my admiration for the remarkable grasp and foresight there displayed has been greatly increased. In regard to the provision of ample structural strength with a minimum of weight, the increase of safety by water tight subdivision and cellular double-bottom, the design of propelling machinery and boilers, with a view to economy of coal and great endurance for long-distance steaming, the selection of forms and dimensions likely to minimize resistance and favor good behavior at sea, and to other features of the design which need not be specified, Brunel displayed a knowledge of principles such as no other ship-designer of that time seems to have possessed; and in most of these features his intentions were realized. The capital was raised, and in the spring of 1853 the construction of the Great Eastern began. After many vicissitudes, she was launched on Jan. 31, 1858, and made her first cruise in September, 1859.

"Exception may reasonably be taken now to the wisdom of the fundamental conditions laid down for the design or to the correctness of the estimates of possible earnings. From the technical side, however, interest centers in the fact that Brunel undertook to produce a ship capable of carrying coal sufficient for the voyage to Australia and back, at an average speed of 14 knots, thirty-six days being allowed for the passage. She was to accommodate 3,000 persons easily, carry a small amount of cargo only on the outward passage, and homeward to bring 'any amount that could be collected,' cargo taking the place of the coal burnt on the voyage out. The great ship was to be equally available for service between England and India if required, carrying coal enough to take her to Calcutta and thence to Trincomalee with 3,000 tons of cargo.

"The dimensions ultimately adopted were: Length over all, 693 ft.; length between perpendiculars, 680 ft.; breadth, extreme, of hull, 83 ft.; breadth over paddle boxes, 120 ft.; depth, 58 ft. At the time of the design (1852-3) it must be remembered that the most powerful Cunard steamers were 285 ft. long, of less than 2,500 tons gross and 5,000 tons displacement at deep draught, having 12½ knots sea speed, the engines developing 3,000 H. P.; while the Himalaya, as previously mentioned, was 340 ft. long,

3,400 tons gross, 4,000 tons displacement, with 2,000 H. P. and 12 knots speed. The screw two-deck line-of-battleship Agamemnon, of the same date, was 230 ft. long, 5,000 tons displacement, and on the measured mile attained 11¼ knots with 2,300 H. P. Under these circumstances it was necessary to subdivide the power, so that the step required of the manufacturers beyond previous experience should be minimized. Brunel decided to associate paddle-wheels with a screw propeller, and to have about 60 per cent. of the total power in the screw engines. Mr. Scott Russell undertook the construction of the latter and of the hull; Messrs. Boulton & Watt made the paddle engines. In both cases the task was efficiently performed, and the engines did well throughout the service of the ship.

"Brunel thoroughly appreciated the paramount importance of economy in coal consumption on a voyage of such great length. He insisted on 25 lbs. pressure, although leading engineers urged him not to go beyond 15 lbs.; he proposed steam-jacketing (with steam supplied from an auxiliary boiler of higher pressure than the main boilers), superheating and improved jet-condensers, besides other devices for preventing waste of heat. On these heads his notes are of the greatest interest. His estimate was that a consumption of 200 tons per day would suffice at 14 knots. Taking 7,000 H. P. only as the power developed, this means that the rate of coal consumption he anticipated would have been 2 2-3 lbs. per indicated horse power per hour. The best practice at that time gave 3½ lbs. to 4 lbs. per horse-power hour; and although many of Brunel's ideas were not carried out in the construction, it is obvious that in this important particular he was much too sanguine. Records of actual consumption are few and somewhat conflicting, but a careful analysis of the figures leads us to the conclusion that at 14 knots the vessel must have burnt at least 350 tons per day, and probably burnt 380 tons to 400 tons. She was never tried on the Australian service, and on the Atlantic her voyages were so few, irregular and marred by accidents that there was no true test of her capability, nor was she run at the deep departure draught of 30 ft.

BRUNEL TOOK COUNSEL LARGELY WITH SCOTT RUSSELL.

"It has surprised me to find no trace in Brunel's notes of any contemplated use of twin screws instead of a combination of screw and paddles. He left so few stones unturned in his search for the best that it is singular to find this arrangement unnoticed. In deciding upon the form and dimensions of the vessel, Brunel took counsel with Scott Russell, and could have found no more competent adviser. Writing in 1857, Scott Russell defined his position thus: 'I designed her lines and constructed the iron hull of the ship, and am responsible for her merits and defects as a piece of naval architecture. Her lines are identical with those of my other ships, which are constructed like this on a principle of my own, which I have systematically carried out during the last twenty years, and which is commonly called the wave principle.' It is obvious also from Brunel's notes that the estimates for engine power to attain the desired speed were made in conference with Scott Russell. It may be interesting to state that, having carefully looked into the matter in the light of present knowledge, I am of opinion that the estimate of power required to drive the Great Eastern at 14 knots, with an average draught of about 25 ft., is practically identical with that which would now be made for the ship if propelled by twin screws. Taking into account the enormous size of the ship in comparison with any other steamer when she was designed, this is a very remarkable result.

"In structure the Great Eastern was not merely a marvel, considering the date of her construction, but is still, in my judgment, a most fruitful and suggestive field of study. Here Brunel was greatly influenced by practice in bridge building. To him a ship had always been a girder, in regard to longitudinal strength, from the time (1840) when he designed the Great Western. In the Great Britain he made many new structural arrangements which proved most successful; and that ship did good service for nearly forty years as a steamer before she was converted into a sailing ship, and subsequently into a hulk in the Falkland islands. When he began work on the Great Eastern, he laid down the 'principle of construction' that 'no material shall be employed on any part except at the place and in the direction and in the proportion in which it is required and can be usefully employed for the strength of the ship, and none merely for the purpose of facilitating the framing and first construction.' The Menai tubular bridge undoubtedly influenced Brunel greatly in the main features of the structure of the Great Eastern, and the experiments made by Robert Stephenson and Fairbairn furnished valuable information. As to strength, the vessel was severely tested during the thirty-two years she remained afloat. She carried enormous loads of submarine cables, encountered very severe weather, ran on the rocks off Montank point and tore a hole in the outer skin 80 ft. long by 10 ft. broad, but proceeded to New York, her passengers being unaware of the damage done. She was repeatedly beached on a 'gridiron' at Milford Haven for repairs; yet throughout this service no signs whatever of structural weakness occurred and local damage was readily made good.

"I have most thoroughly investigated the question of the weight absorbed in the structure of the Great Eastern and my conclusion is that it is considerably less than that of steel-built ships of approximately the same dimensions and of the most recent construction. Of course, these vessels are much faster, have more powerful engines, and have superstructures for passenger accommodation towering above the true upper decks which form the upper flanges of the girders. These, and other features I cannot now specify, involve additional weight; and the Great Eastern has the advantage of being deeper in relation to her length than the modern ships. After making full allowance for these differences, my conclusion is that the Great Eastern was a relatively lighter structure, although at the time she was built only iron plates of very moderate size were available, and the plates used for the outer and inner skins were only ¾ in. thick."

OIL BURNING TRIALS WITH KORTING BURNER.

The Wallsend Slipway & Engineering Co., Ltd., which has taken a prominent part in the application of liquid fuel as a means of generating steam in boilers of every description, recently gave demonstration of a new method of burning liquid fuel in a marine boiler before a number of marine engineers and others interested in the development of petroleum as fuel, several members of the British admiralty committee on liquid fuel being present. Concerning the test Engineering of London says:

"The system of burning the fuel which has been almost exclusively adopted by the Wallsend company up to the present time is that known as the Rusden & Eeles, of which they are the sole manufacturers. With these burners the fuel is sprayed by a steam jet. This system has been very successful, but has the objection that the steam used in spraying the fuel is lost, and the boiler feed-water has to be made up on board ship by the use of large and expensive evaporating plant. The method of burning liquid fuel which was so successfully demonstrated is that known as the Korting system. This system differs from all others in that the fuel is sprayed directly into the furnace simply by forcing it through a Korting sprayer by means of a pump. The use of a steam-jet is therefore entirely obviated, and consequently, with the Korting burner, no additional evaporative plant is necessary. Before reaching the burner, the oil fuel is carefully filtered and heated to a temperature which depends upon the quantity of oil to be burned.

"The boiler on which the system was shown at work is of the ordinary marine type designed for forced draft. It is 12 ft. 6 in. in diameter by 11 ft. long, with two large furnaces 3 ft. 7 in. in diameter. The tubes are 2½ in. in diameter and fitted with retarders. The boiler was completely enclosed in an air-tight house, so as to show the system working under both natural and forced draft conditions. By leaving the doors open the burners were first worked under natural draft. The stokehold was then closed and the fan started, when it was shown that the system may be worked with almost any degree of air pressure; 4½ in. was ultimately recorded on the gauge. On a previous trial it was found that with the boiler as designed—one which had been taken out of a steamer—it was not desirable to go to higher air pressure, as the heating surface was not sufficient to absorb the heat generated. With larger pressure and larger tubes, however, a much higher rate of combustion could be obtained. Throughout the trial no smoke was visible at the chimney. Particulars of the boiler (marine type) with which the trials were carried out are: Mean diameter 12 ft. 6 in.; mean length, 11 ft.; number of furnaces, two; inside diameter of furnaces, 3 ft. 7 in.; number of tubes 262; external diameter of tubes, 2½ in.; total heating surface, 1,695 sq. ft.; grate area under coal, 40 sq. ft.; working pressure 120 lbs. per square inch; all tubes fitted with retarders. The results are tabulated below.

	Coal trial.	Natural draft.	Closed stokehold.
			air pressure 1⅛ in.
Duration of trial	6 hours	5 hours	4 hours.
Class of fuel	Best Mickley picked	Texas oil	Texas oil
Average steam pressure	113 lbs.	115 lbs.	105 lbs.
Average temperature of feed-water	55° F.	80° F.	107° F.
Pressure of oil at burners		75 lbs.	140 lbs.
Temperature of oil at burners		240° F	110° F.
Quantity of water evaporated per hour	7,558 lbs	7,756 lbs.	14 951 lbs.
Quantity of oil burned per hour		633.4 lbs.	1,222 lbs.
Quantity of coal burned per hour	974.3 lbs.		
Water evaporated per pound of oil (actual)		12 24 lbs.	12 23 lbs.
Water evaporated per pound of coal	7 76 lbs.		
Water evaporated per pound of oil from and at 212° F		14.45 lbs.	14 06 lbs.
Water evaporated per pound of coal from and at 212° F	9.31 lbs.		
Equivalent quantity of water evaporated per hour from and at 212° F	9,060 lbs.	9,152 lbs.	17 193 lbs.
Total quantity of ash	283 lbs.		

"We understand that an evaporative test has been carried out, when an evaporation of over 16 lbs. of water from and at 212° Fahr. was obtained per pound of oil fuel consumed. The Wallsend Slipway Co. has already fitted some eighty vessels with liquid-fuel-burning apparatus, some of the most recent installations being on the Korting system."

The United States Civil Service Commission announces an examination Dec. 15-16 in all the leading cities of the country, to secure eligibles from which to make certification to fill a vacancy in the position of local inspector of boilers of steam vessels in the steamboat-inspection service at Portland, Me., at $1,800 per annum, and other similar vacancies as they may occur. Full particulars as to these examinations will be found in the Marine Review of Oct. 15.

EARLY CLOSING OF LAKE NAVIGATION.

Commerce of the great lakes for 1903 may be said to be practically at an end as the freight not yet moved, aside from what may possibly develop in Chicago grain, is nearly all provided for, and the desire on the part of shippers to have the season over with has been more manifest than ever in the past few days. Still as an illustration of the angles to which the trade is subject, even during a very dull wind-up, it may be said that one prominent shipper was unable to get a wild vessel this week to move a single cargo of ore from Ashland. All the available tonnage on Lake Superior was under charter for grain. Of course a vessel upbound with coal might be secured to move this ore by next week but there was nothing immediately available.

All things considered, it is surprising that very little contract ore has been deferred. In two or three cases vessel owners have found it necessary to wait until next year for moderate-sized quantities of ore that they were to move this season, but it is understood that instances of this kind are confined to one new furnace concern that met with difficulties in erecting its ore-storage plant and could not take all of its ore. The coal shippers will also furnish, probably without exception, all the coal for which they made contracts. Those who expect to see vastly increased stocks of ore on Lake Erie docks at the close of navigation will probably be disappointed. While the amount of ore on dock is greater than last year the actual increase, from figures already compiled, is said to be light.

The withdrawal already of nearly all of the vessels of the Steel Corporation fleet may possibly cause some little advance to be paid on final grain cargoes, and there is some tendency in that direction at this writing, but the increase will not greatly enlarge the profits of vessels that remain in commission to the end. The river blockades have, of course, also tended to help grain freights. As though inspired by some ingenuity of the evil one, vessels have had a penchant this season for selecting the most vulnerable points to commerce to either strand or sink. No end of trouble was caused by the sinking of the Glidden in the St. Clair Flats ship-canal. Now, this week, the big steel steamer W. L. Brown, bound down with iron ore, struck on the edge of the east bank of the new cut at the Lime-Kiln crossing and went on the rocks. She landed directly across the new channel. A few hours later the steamer S. S. Curry, bound up with coal, attempted to pass the Brown but was swung by the strong current across the old channel, completely blocking both channels to navigation. This blockade was absolute for twenty-four hours, vessels passing neither up nor down, but it was cleared much sooner than was expected.

OUTPUT OF SOME OF THE LEADING MINES.

Duluth, Minn., Nov. 18.—The big mines of the United States Steel Corporation on Lake Superior, that is those with products of 400,000 tons or more, have been as follows this year, according to figures from the offices of the Oliver and Minnesota companies at Duluth: Fayal, Minnesota, 1,460,815 tons; Mountain, Minnesota, 1,342,697; Adams and Spruce, Minnesota, 1,109,797 and 585,815; Burt, Minnesota, 631,147; Hull, Minnesota, 438,302; Chandler, Minnesota, 460,548; Pioneer, Minnesota, 596,780; Norrie, Michigan, 700,891; Chapin, Michigan, 704,114; Aragon, Michigan 522,035; Lake Superior, Michigan, still shipping but probably 620,000. These twelve mines have produced this year 9,141,303 tons of ore. All but the Mountain and Burt are wholly or in larger part underground.

The corporation's Minnesota product in full was 9,226,815 tons, a decrease of 1,435,000 tons from last year. The ships of the Steel Corporation, under the title Pittsburg Steamship Co., and their contract vessels, have moved this year a total of 12,500,000 gross tons of ore.

Products of mines operated by the Leetonia, Cyprus, Croxton, Bradford, Colonial, Cass, Columbia and La Rue mining companies (International Harvester group), all managed by Mr. Jos. Sellwood, of Duluth, have been as follows: Leetonia, 200,160 tons, Cyprus 122,201, Croxton 100,645, Pearce 50,429, Morrow 49,409, Kanawha 24,844, Cass 52,905, Longyear 81,823, La Rue 54,000, Agnew 108,982 and Hawkins 107,773; total for Mr. Sellwood in Minnesota, 953,181. He has also the Brotherton and Sunday Lake, 100,000 tons each, on the Gogebic range, and the Illinois mine at Baraboo, Wis.

Mines operated by Pickands, Mather & Co., in Minnesota, have shipped as follows this year: Corsica, 34,034 tons; Elba, 93,630; Minorca, 115,000; Sparta, 40,373; Malta, 11,675; Troy, 15,000; Albany, 120,000; Utica, 155,000. On the Gogebic—Cary, 86,723; Mikado, 112,000. On the Menominee—Baltic, 128,470; Vivian, 11,878; Verona, 49,735; Hemlock, 79,179; total, all ranges, 1,052,707 tons. Pickands, Mather & Co. are still shipping from five mines, three in Minnesota and two on the old ranges. These will probably be busy into December if weather conditions do not interfere. The Minorca mine, which is one of those at work, will close down as soon as a certain quantity of ore is moved. Their Hemlock is closed but may soon resume.

LAKE SHIP YARD MATTERS.

During the week Mr. J. C. Wallace, general manager of the American Ship Building Co., closed a contract with Mr. G. L. Douglas of the Western Transit Co. for a package freight steamer to be a duplicate of the Chicago and Milwaukee. She will be 345 ft. over all, 325 ft. keel, 44 ft. beam and 30 ft. deep and will be equipped with quadruple-expansion engines with cylinders of 19, 27½, 40 and 58 in. diameter by stroke of 42 in., supplied with steam from three Scotch boilers, 12 ft. in diameter and 12 ft. long, fitted with the Howden hot draft system. She will be laid down at Lorain and is promised for May 1 next. She will be used in the trade between Buffalo and Chicago.

The Craig Ship Building Co., Toledo, has secured the contract to build the steamer long talked of for the Indiana Transportation Co. of Michigan City, Ind. She has been designed by Mr. W. J. Wood, naval architect of Chicago. The new steamer will be 210 ft. long, 36 ft. beam and 14.6 ft. deep and will have capacity for 1,500 passengers. She is designed for a speed of 18 miles an hour and is to run between Michigan City and Chicago. She is promised by May 15 next.

The American Ship Building Co. will lay on Monday next the keel of the new 560-footer for Capt. A. B. Wolvin of Duluth. Lorain has been selected as the place where the monster will be built. She will be by far the largest vessel on the lakes, exceeding by 62 ft. in length anything now afloat. Great care has been exercised in preparing her plans and a number of changes have been made from the design as originally planned. She is promised by the opening of navigation.

It was quite fitting that Mrs. Logan, wife of Robert Logan, assistant general manager of the American Ship Building Co., should christen one of the several large car ferries built for the Pere Marquette company, as Mr. Logan has had much to do with the design and construction of all these vessels. Mrs. Logan christened Pere Marquette No. 20 at the Cleveland yard of the American Ship Building Co., Saturday. Both launch and christening were a success. The new car ferry is 350 ft. over all, 338 ft. keel, 56 ft. beam and 36 ft. deep. She will have two sets of triple-expansion engines with cylinders of 19, 31 and 52 in. diameter by stroke of 36 in. Steam will be furnished by four Scotch boilers, 13 ft. 9 in. in diameter and 12 ft. long. The car ferry has capacity for thirty cars and is intended to make a speed of 16 miles loaded. She will be got ready to leave for Lake Michigan about Dec. 15. Pere Marquette No. 19, which is similar to the vessel just launched, will leave the Cleveland yard on Saturday of this week.

The steel collier Marquette & Bessemer No. 1, built for the Pere Marquette Railroad Co., was launched on Saturday afternoon at the Buffalo Dry Dock Co.'s yard. Miss T. A. Sauer, a stenographer employed in the office of the dry dock company, named the collier. This vessel is really of the car ferry type but she is designed to carry coal and not cars. She is fitted with tracks upon which the cars run for the purpose of dumping the coal into the hold. The tracks are made to fold up so as not to interfere with the unloading machines, leaving practically a continuous hatch from one end of the vessel to the other. The collier is comparatively small, being 255 ft. over all, 241 ft. keel, 43 ft. beam and 28 ft. deep. She is fitted with triple-expansion engines of 17, 27½ and 46 in. cylinder diameters by 36 in. stroke. Steam is supplied by one cylindrical boiler fitted with Howden draft. The collier will run between Conneaut and Rondeau, Lake Erie.

At the Superior yard of the American Ship Building Co., the steamer Wisconsin, building for H. A. Hawgood of Cleveland, was launched on Wednesday of this week. She is 434 ft. over all, 414 ft. keel, 50 ft. beam and 28 ft. deep. She will be equipped with triple-expansion engines of 22, 35, 58 in. cylinder diameters by stroke of 40 in., supplied with steam from two Scotch boilers, 13 ft. 2 in. in diameter by 11 ft. 6 in. long, equipped with Ellis & Eaves draft.

It is reported that the Rutland Transit Co. will build a new steamer to replace the W. L. Frost which was recently wrecked on South Manitou island. All efforts to save the Frost proved unavailing and she has been abandoned.

Capt. James Davidson has completed at his West Bay City yard the work of rebuilding the wrecked steamer Craig which he purchased at public sale in Detroit recently.

DULUTH SHIPPING ITEMS.

Duluth, Minn., Nov. 18.—There are now in store at the head of the lakes, all grains, 10,075,000 bu. Of this perhaps 3,000,000 bu. of wheat is to go forward this year and as much other grains, and this amount is being added to daily as sales are made to the east, Chicago and Europe. The latter is not an insistent buyer. Indeed Chicago has for the past week seemed to give local shippers about all the business they have been able to get. It is probable that 2,000,000 bu. remain to go there on late purchases of wheat for mixing. The total receipts of all grains last week was 4,205,000 bu.; shipments 3,676,000 bu. It is probable that receipts may diminish somewhat. Well-posted men from the interior say that in their judgment the movement from North Dakota is nearly over, so far as bulk is concerned.

Flour receipts are smaller and the railroads are trying to clean up everything on hand as fast as possible. The season is really not so nearly over as it appears, but the withdrawal of so many ore ships and the evident intention to close early in almost every line makes it look as though we were in December instead of the middle of November. There are now but five iron mines shipping in this state, and a very small number from other states, while last year they were at work up to Dec. 18.

Nearly all the flax in store here has been chartered to go to Buffalo, where it will remain afloat all winter, the rates being based on spring delivery. Most of this will be on vessels of the Tomlinson and Davidson fleets, and it is understood to amount to about 4,000,000 bu. There will be quite a saving in insurance and other charges by this move, which is of considerable importance. The American Linseed Co. is moving this stuff.

It is expected that the coming year elevator building at the Canadian Lake Superior terminals will be active again, and that a large increase in capacity will be made. This may include a 500,000-bu. addition to the King elevator at Port Arthur, another storehouse of tile or concrete for the Canadian Northern, and possibly a wheat hospital for the same company.

Lake copper interests have a good deal to say of their big shipments, east and they are sending forward a great deal of metal, but there is actually less copper moving east by lake than for some years (very much less than four years ago), the reason being the diminution and diversion of Montana shipments. The close of lake navigation will find all lake copper docks and smelters bare of metal. On Nov. 20 the Calumet & Hecla will ship the last cargo of mineral to its smelters at Buffalo.

Powell & Mitchell of Marquette have completed their work at Grand Marais harbor, Lake Superior, for the year. They have put in 450 ft. of breakwater crib, bringing the length up to 1,200 ft. The work, though completed under the present contract, is far from through, and much remains to be done to make Grand Marais what the government designs, a safe harbor of refuge. It is much used and is an important refuge in the severe storms that sweep eastern Lake Superior.

There are rumors and publications to the effect that the raising of the sunken steamer Thos. Wilson is to be attempted at once. There is nothing in it. The court of admiralty is reviewing the facts as to the collision of the Hadley and Wilson on the petition of Wm. P. Rend to limit liability of the Hadley.

The Superior Iron Works will erect a 60-ton gantry crane at the new pier, Superior entry, to be in position next spring.

WORK OF ASSIMILATING IMMIGRANTS.

Mr. Daniel J. Keefe, president of the International Longshoremen, Marine & Transport Workers' association, made a speech at the Chicago meeting of the National Civic Federation which attracted a great deal of attention. The keynote of it was that labor has to assimilate the vast influx of immigration each year and that in passing judgment upon unions probably not enough credit is given for the work which they have to perform in drilling and disciplining this raw material. Mr. Keefe said:

"Much of the evil complained of in unions arises from the fact that the organizations have too much raw material to work over. The older of the labor organizations have, or cause, little or no annoyances or criticism. It is the new unions and new recruits that are lacking in tact and training, but if we are patient all will come in due time. The immigration question in its relation to labor is given but passing consideration by the employers, but our critics could, with considerable profit, find much food for reflection, as to cause and effect, were they to devote a little time to study and investigation of this phase of the social question. At present, it would seem impossible to predict the result of the enormous and seemingly endless time of immigration.

Do our critics ever stop to think that it is the labor organizations who are obliged to assimilate the aliens faster than is possible to do so? The discussion of the various methods of dealing with many of the vexed problems of labor does not take into account or consider the real conditions that surround the life of the American wageworker and all that is imposed upon him. When we read in the report of our commissioner general of immigration of 462,698 aliens arriving in 1901; of 619,544 in 1902, and the expectation of 1,000,000 for 1903, and the prospect increasing yearly, rather than diminishing, we stand aghast, and ask if we are capable of assimilating this gigantic host. That our labor leaders are amazed at this never-ending stream, and at times despair, is but natural when we contemplate that the labor organizations undertake the bulk of the work involved. That, with this army, our awkward squad should be quite numerous, and not all the recruits understand the duties, obligations, etc., which are so suddenly thrust upon them, is only natural. The level of the American workmen is only attained after considerable educational effort on the part of our organizations.

"The study of our government, its laws, the duties and obligations, and privileges of citizenship, the new ideas of sanitary, moral and social existence, and the general culture in their new and strange environment, is the work and labor of the unions with the parents, and will be until such time as the public school fits the younger generation with sufficient knowledge of American life to impart to the elders. You cannot, like the adventurer in the Greek comedy, take these millions and by some magic bath restore them from disease, vice and ignorance, to manliness, virtue, self-respect, knowledge and wisdom. This is only accomplished by patient effort, and that is what the labor organizations are silently endeavoring to perform; and all things considered, is not the small amount of violence surprising?

"The National Civic Federation should have a standing committee on immigration to study cause and effect and assist the labor organizations in the work of assimilation; also, from time to time, to make recommendations to congress of reasonable and humane regulations relative to immigration, in order that the American standard may not be lowered; also, to use every endeavor to stimulate industrial education in all parts of the country."

DULUTH, MESABI & NORTHERN ORE SHIPMENTS.

One of the Minnesota ore roads, the Duluth, Mesabi & Northern, is reported to have finished shipments for 1903 and is credited with a total of 5,339,957 gross tons as compared with 5,610,407 gross tons for the season of 1902, a decrease this season of 270,450 gross tons. A table of shipments over this road for the season is appended herewith. It must be noted, however, that some of the mines in the list are also shippers over other Minnesota roads and the output of these mines is therefore not fully represented. The Biwabik mine, for instance, forwarded most of its output by lake this year over the Duluth & Iron Range road and its total shipments are in round numbers 850,000 tons.

Mines.	1903.	1902.
Adams	1,100,759	1,242,923
Spruce	587,032	543,397
Troy	10,267	.....
Duluth	7,405	150,220
Biwabik	10,722	623,128
St. Clair	6,148	.....
Burt	429,711	100,331
Day	111,009	106,516
Glen	171,705	23,875
Hull	432,916	423,266
Pittsburg	229,133	238,122
Rust	160,624	242,715
Sellers	251,631	193,428
Lincoln	279,632	87,779
Poole	200,029	.....
Mesabi Mountain	5,866	5,131
Mountain Iron	1,217,156	1,430,103
Etna	119,212	199,473
Totals	5,339,957	5,610,407
		5,339,957
Decrease		270,450

LAKE CARGO RECORDS.

Another of the large steamers managed by Mr. A. B. Wolvin of Duluth has broken the grain cargo record. The steamer J. H. Reed of the Provident Steamship Co.'s fleet on Thursday last loaded at Chicago 271,000 bu. of wheat equal to 8,130 tons. The records to date are:

Iron ore—Steamer Wm. Edenborn, owned by Pittsburg Steamship Co., A. B. Wolvin of Duluth, manager, 8,807 gross or 9,864 net tons, Escanaba to South Chicago.

Grain—Steamer J. H. Reed, Provident Steamship Co., A. B. Wolvin of Duluth, manager, 271,000 bu. of wheat, equal to 8,130 tons (2,000 lbs), Duluth to Buffalo; steamer Rensselaer, Pittsburg Steamship Co., A. B. Wolvin of Duluth, manager, 151,000 bu. of wheat, 94,000 bu. of barley and 55,155 bu. of oats (300,155 bu. in all), equal to 7,068 tons, Chicago to Buffalo; steamer Mataafa, Pittsburg Steamship Co., A. B. Wolvin of Duluth, manager, 185,399 bu. of corn, 40,000 bu. of rye and 43,600 bu. of wheat (268,000 bu. in all, equal to 7,619 tons, Chicago to Buffalo.

Coal—Steamer I. L. Ellwood, owned by Pittsburg Steamship Co., A. B. Wolvin of Duluth, manager, 7,688 net tons anthracite, Buffalo to Duluth; steamer John W. Gates, Pittsburg Steamship Co., A. B. Wolvin of Duluth, manager, 7,659 net tons of bituminous, Lorain to Duluth.

The Canada Atlantic Transit Co. (Chicago-Parry Sound route) will erect during the coming winter another elevator at Depot Harbor on Parry Sound, Ont., which will have 1,250,000 bu. storage capacity. It will be operated by Mackenzie & Moon. Grain has been going into the tanks of the new steel elevator of the Canadian Pacific system at Fort William, now receiving the finishing touches by the Macdonald Engineering Co. of Chicago, the engineers and builders.

CANAL TALK FROM BUFFALO.

Buffalo, Nov. 18.—There is a curious division here on the question of Erie canal enlargement, which was not allowed to develop before election. If it had, the opponents of the movement might have tried to use it against its friends, though it really has nothing in it that is at all dangerous. I refer to the quiet, but no less determined, opposition on the part of the old canal boatmen. They did not appear to desire notoriety in regard to their attitude, no doubt realizing that they were in no position to put up any sort of a fight, but they were right from their individual selfish standpoint.

I said to Harris Fosbinder, a few hours before his sudden death last Wednesday, that I supposed he was all right on the enlargement and he replied that he didn't want an enlarged canal and then added by way of softening the expression that he didn't want any canal. He was one of the few boatmen who made money in the business and yet he shared the feelings of the others who did not make money as boatmen.

It is a fact that the boatmen have made money moderately for the past two or three seasons, but they generally say that it was only possible to do this because of the small size of the fleet. Had it been large the boats would have been idle too much to make a profit, according to the ideas of the boatmen. The canal fleet was at one time the controlling element in the transportation business between Buffalo and New York, from its size alone. There were 3,000 grain boats alone and they all made money. Then the roads began to make the rates of freight and the boats had to take the freight that the roads did not want and no boats were built, till now there are only about 500 grain boats left and the reason that they are run at a profit is that there is enough freight that the roads do not want to keep them busy.

The boatmen figure that the insurance companies will close down and out of the grain and merchandise-carrying trade forty to fifty boats a year, as they have been doing right along, so that in a short time the fleet will dwindle to a mere nothing. They do not care to build more boats of the present size, as they would hardly pay for themselves before the larger size will be available, so they pretty generally are preparing to go out of business as soon as their present boats are used up. As few of them have money sufficient to build and operate fleets of the larger size there seems to be nothing else for them to do but retire before long. Very naturally they felt that while it might be for the larger interest to enlarge the canal it was not for their individual interest. They must go just the same, so they may be excused for ill feelings towards a movement that promised to give no place to a class of business men who had been in a way instrumental in keeping the canal alive all these years when New York was hesitating over the enlargement policy.

It is easy for others to see, as well as the old boatmen, that the enlarged canal is to be for the corporation and the large capitalist, instead of the farmer with a pair of boats to run from May to December and to live with his motive power on his farm in winter. It is this larger idea that is to crowd out the old one, and sad as such growth is when it must be done by rooting out the older growth, nobody doubts that the times demand it. The canal would soon go anyhow as it is, so there seems to be no chance for the old boatmen, and they are going, too, very fast now.

Speculation ranges from six years to ten in the estimate of the time it will take to build the new canal, and it is fully believed that by that time there will be plenty of tonnage to operate it. The railroads will be among the first to enter this new competition for business, as they cannot allow the route to be controlled by individuals, as for instance the shippers themselves. Rates will be low, as there will always be enough of the unattached boat owners to compete with the corporations. The very state farmers who opposed the enlargement, and who now get low rail rates on account of the canal, will continue to enjoy them then.

Of course Buffalo and New York are looking to their own interests in the canal. Buffalo for an outlet to her manufactures, largely to be established in consequence of cheap transportation, and New York is uneasy over the loss of her commerce. It should be noted that Buffalo is still holding her commerce in spite of encroachments. But for the full elevators there would be a substantial increase of grain receipts here this season and it may be the case in spite of the failure of the roads to keep the elevators free. This means that the eastern farmer is growing less and less able to raise his own grain and is buying it from Buffalo before it reaches New York.

JOHN CHAMBERLIN.

DAVIDSON PLEASED OVER CANAL ENLARGEMENT.

Capt. James Davidson of West Bay City, Mich., who has a ship yard in which to build wooden vessels and the means to go into any undertaking on a very large scale, says he will certainly build steam barges—a hundred of them—for the enlarged Erie canal. He says he will keep fully in touch with the work of canal improvement in New York state and will be one of the first to build the new type of 1,000-ton barges for the enlarged canals.

"An enormous business in the canals will certainly follow their completion," says Capt. Davidson. "Of course I intend to enlist the co-operation of people who will have business to give to the canal boats, and to this end will organize, with large capital, a forwarding company that will have agencies in New York, Buffalo, Pittsburg, Cleveland and other places where business may be secured. Arrangements can also be made for running the boats up Lake Erie to Conneaut, Ashtabula, Cleveland, Toledo and other ports on that lake, but it would probably not be practical to run them above Lake Erie. I would have all steam vessels, as I do not believe there will be any economy in towing in the new canals, and would give them power to make 6 miles an hour in the canal and 8 miles on the lake."

AIDS TO NAVIGATION FOR THE LAKES.

Congressman Burton of Cleveland will again give attention in the present congress to the work of securing if possible appropriations for such aids to navigation—lights, fog signals, etc.—as are urgently needed on the great lakes. Mr. Burton has been in correspondence with Capt. Geo. P. McKay, chairman of the Lake Carriers' committee on aids to navigation, and will go very thoroughly into the matter with lighthouse board officials and with other members of congress from the lake region. Capt. McKay has submitted the following list of new lights and fog signals, put down in their order of importance as he views them:

1. (Eleventh Lighthouse district). Light and fog signal on Rock of Ages, southwest end of Isle Royal, Lake Superior, where several vessels have been totally wrecked within the past few years. The passage north of Isle Royal is very much used during fall storms from the northward by vessels coming from and going to Duluth. By this route comparatively smooth water is found and it would be very much used if a light was provided. In the absence of a light on Rock of Ages, however, vessel masters often prefer to thresh it out southward of the island; this in preference to approaching the head of Isle Royal in its present unlighted condition.

2. (Eleventh lighthouse district). Light-ship and fog signal on St. Martin's reef, northern end of Lake Huron, between Detour and Mackinaw. The lighthouse officials have information on file as to why this light and fog signal is needed. Every year the trade between Lake Superior and Lake Michigan increases; increases in much greater ratio than the trade in any other line on the lakes; and all vessels in that trade must pass close to St. Martin's reef. Not a season passes without several strandings in thick and misty weather, some of them resulting very disastrously. This is certainly one of the most important aids now required.

3. (Ninth lighthouse district). Light-ship and fog signal on Simmon's reef, Straits of Mackinaw. As the north passage of the islands in this vicinity is the route used by the Escanaba ore vessels and other vessels in the Green bay trade, and more or less fog and thick weather prevails during a large part of the season, the record of losses in this locality would run into big sums for even a few years past. The present season has seen one total loss and several strandings.

4. (Eleventh lighthouse district.) Light and fog signal on Nine-Mile point, Lake Huron, eastern entrance to the Straits of Mackinaw. As all of the vessels from lakes Erie and Huron, and in fact all the lower lake points, bound for Lake Michigan, as well as the Lake Michigan vessels bound in the other direction, use this passage, it is of very great importance that a light and fog signal should be established here. Vessel masters are a unit in asking for this aid to navigation.

5. (Ninth lighthouse district.) A fog signal on Grand Point Sauble, Lake Michigan. Masters of Lake Michigan passenger vessels have repeatedly made requests for this fog signal. Grand Point Sauble is the most extreme westerly point of the main land of the lower Michigan peninsula, and it is the first place to indicate the correctness of a course after leaving Chicago.

6. (Eleventh lighthouse district). Light and fog signal on Pigeon point, Lake Superior, at the mouth of Pigeon river, which is the boundary between Minnesota and Canada. This light is first greatly desired as a coast light between the main land and Isle Royal, but it would also be a guide into Pigeon bay, and the establishment of the light would make Pigeon bay available as a harbor of refuge in a part of Lake Superior where a harbor of refuge is very much needed. The bay is now a large natural harbor with good water and good holding ground. Such a harbor of refuge would be valuable for the vessels at all times, but especially so in fall storms.

7. (Ninth lighthouse district). A light on Sleeping Bear point. With the smoke of the lake region nowadays, it is no great exaggeration to say that land is seldom seen at night, especially the yellow sand of Sleeping Bear point. Not a year passes without from two to five disasters in the way of strandings in ordinary clear weather on Sleeping Bear point. Even within the past few days a Chicago package freighter with valuable cargo, the W. L. Frost, has been lost in this vicinity.

8. (Eleventh lighthouse district). Re-establishment of Rock Harbor light and fog whistle, Isle Royal, Lake Superior, so as to make Rock Harbor available as a harbor of refuge. In regard to this item the lighthouse officials have also had requests from the vessel interests on several occasions.

While entering Toledo harbor a few days ago the big steel steamer Luzon collided with the closed draw of the Wheeling & Lake Erie railroad bridge, blocking the harbor and closing the bridge to traffic. It required four days' work to remove the damaged draw.

Capt. W. L. Averill, one of the best known vessel masters of the lakes, died at his home in Painesville, O., last week. He was fifty-seven years old and had sailed since boyhood. For the past seventeen years he had commanded the Peerless.

CANADIAN SHIPPING NOTES.

The M. S. Dollar Co., Ltd., has been incorporated in British Columbia to acquire the steamer M. S. Dollar of Victoria. The capital is $180,000. A number of these Dollar companies have been incorporated in British Columbia during the year. The shareholders are all United States citizens, and the vessels are operated between United States ports and the Orient. A number of the vessels were registered at St. Thomas in the Danish West Indian isles when it was expected that they would be sold to the United States, and on the undertaking falling through they were brought to the Pacific ocean and registered in Canada.

The Imperial Dry Dock Co. has secured approval of the Dominion government for its plans for a dry dock at St. John, N. B., and will call for tenders for its construction early in December. Two months will be allowed intending contractors to examine the site, make borings, etc.

The Western Trading Co. has been incorporated at Shoal Lake, Man., with a capital of $90,000 to carry on a general trading business and incidentally to own and operate boats, tugs, barges and vessels of all kinds. The McMillan Bros., railway contractors, Westbourne, Man., are among the promoters of the company.

A proposition to construct a large dry dock is under consideration at Vancouver, B. C. A local syndicate proposes to raise $500,000 towards the cost, and will take advantage of the government subsidy of 3 per cent. on the cost for twenty years, up to $30,000 a year.

An order has been placed with a local firm for the hull of a tug 110 ft. long, 20 ft. beam and 12 ft. deep, and with a Glasgow, Scotland, firm for the engine and boilers, by the New Westminster Towing & Fishing Co., Ltd., New Westminster, B. C.

St. John, N. B., harbor authorities are considering plans for the improvement of the harbor accommodation at a cost of $2,000,000.

AROUND THE GREAT LAKES.

With the arrival of the steamer Western States at Detroit Tuesday, the Detroit & Buffalo Line quit business for the season.

New York state canals will be closed to navigation at midnight Saturday, Nov. 28. The past season has been a prosperous one for canal men.

Engineer Eugene M. Murdock of Port Huron died at Emergency hospital, Buffalo, Monday as a result of injuries sustained from a fall into the hold of the steamer Orion.

The steamer Newaygo is ashore on Devil's island, Georgian bay. She stranded in a snow storm and is reported to be in an exposed condition. She is owned by Henry McMorran of Port Huron.

An Ottawa dispatch is to the effect that a new side-wheel steamer is to be built by the Calvin Co., Garden Island, Ont., for service between Ottawa and Kingston. She will be similar to the Chieftain.

Owners of the steamer Ionia have libeled a cargo of coal which she took to Racine. They claim she was compelled to wait twenty-five days at Racine for a dock at which to unload the cargo.

Capt. Angus McGougan, an old lake captain, died at Dresden, Ont., last week. He sailed the lakes from boyhood. For fifteen years he was captain of the Atmosphere. Latterly he had been in the May Richards.

The steamer Advance, owned by James Carruthers of Montreal, has been raised from the Canadian channel at Sault Ste. Marie, where she burned and sank a month ago, and has been taken to Collinwood for repairs.

E. J. Tobin & Co. of Jackson, Mich., were the only bidders for the construction of a concrete pier for Spectacle reef light station, Lake Huron. Their bid was $105,600, the government to furnish all the gravel for the concrete.

The steamer C. H. Greene, commanded by Capt. C. A. Little, was last week fined $1,000 by Collector of Customs Willcuts at Duluth for not having reported within the time limit specified by law after having arrived from a Canadian port.

The highest freight rate paid in years for carrying lumber is specified in the charter of the steamer Westford and barges Magee and McGill. The tow is to receive $4 per 1,000 ft. for a cargo of hardwood lumber from Alpena to Buffalo.

Enoch Marsden and J. W. Patterson of the Cleveland branch of the Seamen's Union have been elected delegates to the International Seamen's Union convention, which will be held at New York Nov. 23. The lakes will send nine delegates to the convention.

It is announced by the minister of canals at Ottawa that the great lift lock in the Trent canal at Peterboro will be opened for business next week. The Welland canal is to be lighted by electricity from end to end and the Galoups canal is to be deepened to 14 ft.

Capt. J. M. Fields, who has had a very successful season on the lakes at the work of adjusting compasses, has started for his home in California, but will be back again next spring. He has business in New York and will go home from that city by way of New Orleans.

Jacob Vanweelden, for eleven years with Grand Haven life savers, has been promoted to a captaincy and ordered to assume charge of the station at South Manitou island, one of the most important stations on the lakes. He succeeds Capt. Lafburg, who was transferred to Racine.

A dispatch from Washington says that the supreme court has denied the petition of Attorney F. H. Canfield of Detroit for a writ of certiorari in the interest of Henry W. Watson, owner of the steamer Inter Ocean, which was subjected to damages on account of a collision in the Detroit river some time ago that resulted in the sinking of schooner Fontana.

The steamer Minnesota of the Corrigan fleet, is beached in the St. Clair river just below Grande Pointe. She was upbound with a cargo of coal but fire broke out in her and gained such headway that the crew were unable to cope with it and were forced to beach her. It is reported that she will be a total loss. She is insured for $30,000 in companies represented by Smith, Davis & Co. of Buffalo.

The steamer B. Lyman Smith of the United States Transportation Co.'s fleet became disabled on Lake Superior a few days ago. She was picked up by the steamer Mohawk and towed into Washburn. The Smith was bound down from Duluth with a cargo of ore and when off Devil island she blew out her high pressure cylinder head and piston follower. No one was injured. The Smith was taken to Duluth for repairs.

About Nov. 20, 1903, lens-lantern lights, showing fixed red during periods of 10 seconds separated by eclipses of 10 seconds' duration, will be established 32 ft. above mean lake level, on the square, pyramidal, skeleton, steel towers, recently erected on both easterly and westerly ends of the breakwater at the entrance to Portage Lake ship-canals. On the same date the temporary fixed red post-lantern lights will be discontinued.

The facts of the collision of the steamers Thomas Wilson and George G. Hadley, which resulted in the sinking near Duluth of the Wilson in July, 1902, will be reviewed in the court of admiralty at Duluth this week when the petition of William F. Wrenn to limit the liability of the Hadley to her value will be heard. The Hadley and Wilson collided just outside the Duluth ship canal when the latter steamer was leaving the harbor with a cargo of ore. The Wilson sank almost immediately in about 70 ft. of water and has been regarded as a total loss. The responsibility for the accident has never been definitely fixed but it is expected that some light upon it will be shown in the hearing.

Although the wreckers at work on the sunken steamer Glidden in St. Clair Flats ship-canal have been trying for over a week to get the necessary number of chains under the after part of the vessel so as to lift it out with pontoons, the actual job of lifting is almost as far away as it was some time ago. Bad weather has had much to do with the delay, but the wreckers have found it a more difficult job to get the chains ready than they at first anticipated. Three chains are now in position and three more will have to be placed. The steamers Snook and Groh are alongside the wreck and divers have been making examinations and cleaning up constantly. Major Bixby says: "We are making progress very slowly on account of the difficult nature of the work. Being in the canal as it is the wreckers have not got a freedom of movement which would help them, the bottom of the canal is made up of soft sticky mud several feet deep and it is hard work and very slow work at that to get everything in readiness. Another thing is the fact that vessels have been but little hampered in their movements, and in order to keep the canal constantly open for their use our work of removing the wreck has been necessarily slower than it otherwise would have been."

It is understood that the government will soon be asked to establish another aid to navigation in order to help masters of vessels entering Detroit river from Lake Erie. What the masters want is a water gauge register, after the pattern shown on Smith's coal docks, located at the Bar Point lighthouse to show the depth of water over the Lime-Kiln crossing. Assistant Engineer Dixon, in charge of government improvements in the lower Detroit river, is now completing an automatic water gauge and register, which it is the intention of the government to station at Amherstburg and have connected by means of electric equipment with the coal dock registers, and at Detroit. If the new device will register at Detroit the depth of water over the crossing it will also register at Bar point, if the necessary connections are made. It is argued that after the first cost of installing a cable to Bar Point light station, there will be no extra expenses to the government and the device will cost nothing to maintain, as there is a crew of five men at the light all the time during the season of navigation, and it would be an easy matter for them to change the figures of an illuminated sign and tell every vessel master at a glance just how much water he may depend upon over the crossing.

Mr. Harvey D. Goulder, counsel for the Lake Carriers' association, was in Chicago last week looking into the question of Chicago river. Vesselmen believe the current in the south branch to be excessive and are drawing up a protest to be presented to the federal government at Washington. It is claimed that the drainage board maintains a higher current than is allowed. It will also be stated that the drainage board is not making an honest effort with the means at its command to enlarge the river and thereby lessen the danger to vessels. Instead of using the ample funds at its disposal, it is claimed, the drainage board is now planning to spend a large sum in opening a new channel from the Calumet river, thereby showing a purpose to delay the improvement of the Chicago river. "So long as Chicago was showing a disposition to improve the river as rapidly as possible," Mr. Goulder said, "vesselmen were inclined to overlook the fact that the flow in the river exceeded the rate in the permit issued by the secretary of war. It now looks to us as if the drainage trustees intend to take it easy on improving Chicago river and to spend the funds available in other directions. That is a

proposition we will not submit to. The position of the Lake Carriers is that the rate of flow in the south branch must not be allowed to exceed 1¼ miles an hour. We intend to fight it out on that line before the secretary of war."

STAGES OF WATER ON THE LAKES.

Gage records of the United States lake survey show the following mean stages of water above mean sea level for October, 1903:

	Stages during Oct.	Higher than during same month last year.	Lower than during same month last year.	Higher than during Oct. 1895.
	ft.	ft.	ft.	ft.
Lake Superior	602.89	0.59	....	0.31
Lake Michigan	580.30	0.41	....	1.38
Lake Huron	580.26	0.50	....	1.05
Lake Erie	572.34	....	0.40	1.45

The present fall from Lake Huron to Lake Erie is 0.54 ft. more than it was a year ago.

SEA POST OFFICES.

A recent news paragraph announcing that certain express steamships in the North Atlantic trade are now being equipped with sea post offices and that such offices will be in operation shortly on board the Oceanic, Majestic, Teutonic and Cedric, calls attention to one of the important, though little known, features of the government's mail-carrying enterprises. Many persons have a vague idea of what a sea postoffice is and think that it has to do with the handling of letters to or from the passengers on the Atlantic liners. As a matter of fact the sorting of letters written by persons aboard ship does form one small item in the work of the ocean post office clerks, but the primary purpose of the institution is to facilitate the movement of the immense amount of foreign mail matter passing back and forth between the United States and Europe.

The sea post office is distinctively an American idea. The first offices of this kind were established on the American Line steamships a few years ago when clerks were placed on the steamers to aid in handling the heavy mails between London and New York. The plan proved so valuable that later on arrangements were made with the German postal authorities by which it was introduced on some of the ships running to German ports. The White Star Line is the fourth to be provided with these offices, so that the system may be said to be pretty firmly established on the Atlantic. Postal officials say that it is responsible for very important gains in the delivery of the heavy ocean mails. It is especially important in lessening in some measure the congestion of the New York post office, in which the inadequacy of the facilities provided for handling the business that passes through it has become notorious.

The equipment of a sea post office is simple. It consists merely of a couple of rooms below deck on a transatlantic steamship fitted with tables on which the mail bags can be emptied, separation cases with many pigeon holes for use in the work of assorting and pouching cases for holding the sacks in which the mail is placed after the assorting is completed. Usually one room is used for "working" papers and packages and for storage and the other for letters and registered mail. On the American liners and one the White Star boats three postal clerks are usually carried; when mails are light the number is reduced to two. On the eastward voyage there is little for the clerks to do, for the outgoing foreign mail is very thoroughly assorted and made up for European cities and railway mail routes in the foreign branch office in New York. Most of the work on this half of the voyage consists of making up and "routing" the letters and postals mailed by passengers on board the ship. This sometimes amounts to as much as 4,000 pieces—evidently many persons take advantage of the ocean voyage to pay off their correspondence obligations—but comparatively little time is required in disposing of this.

On the westward voyage there is a different story to tell. The English ships always carry a heavy British mail which is put on board at Queenstown, and the American liners, while not receiving much from this source, always carry a large consignment from the continent. This mail is not separated with any such thoroughness as that which leaves New York for Europe. All the matter destined to the United States must be separated by the clerks and made up in packages for different cities and railway mail routes just as is done in the case of domestic mails in all the larger offices of the country. As the number of pieces frequently amounts to a million or thereabouts, and many of them are illegible or incorrectly addressed, the clerks have no easy time of it. They regularly work from ten to twelve hours a day, and even with this steady labor they rarely complete the separation entirely by the time the steamer reaches New York.

On the German ships the same system is followed, but since these offices were established jointly by the American and German post office departments, the ships carry clerks of both nationalities and the mail is sorted in both directions. That is to say, the mail for Germany is given a division en route more complete than that which it receives before leaving New York and the United States mail is separated on the westward voyages as on the Southampton ships. Two German and two American clerks are assigned to each steamer and they work together. While the German clerks theoretically are concerned only with mail destined to their own country, the Americans help them in handling this in return for their assistance on the return voyage. Thus the work on the German boats is really easier than that on the Southampton and Liverpool vessels with their alternate voyages of heavy rush and comparative idleness.

There are now nineteen sea post offices in all, operated either wholly or partially under the control of the United States post office department. The clerks are assigned from the regular department ranks and there is no difficulty in finding men to fill the positions, for the work on the whole is not difficult and holds attractions for the man to whom the sea is a good friend. The practical value of the sea post offices is demonstrated on the arrival in New York of any transatlantic steamship that carries one. The mail is taken off the ship at Quarantine by the government mail boat Postmaster General, which, with its white sides, red smokestack, and United States mail flag, is a familiar object to every person who spends much time on the harbor or along the water front. Since the mail has been separated on the ship and placed in bags labelled "Chicago," "Boston," "St. Louis," "New York," "Chicago railway post office," and so on, there is no need for that destined to interior points to be held in the New York office to undergo the laborious process of separation and repouching. Indeed it does not have to pass through the New York office at all. The mail boat delivers it direct to some pier convenient to the railway station from which it is to be sent. The postal officials say that an average of from six to eight hours is gained in the delivery of all mail through the better railway connections which are made. The letters and papers for New York city are taken direct to the main postoffice or the branch stations from which they are delivered. Thus the mail brought in by a steamship arriving at noon is ready for delivery at 2 o'clock instead of by the latest afternoon delivery or possibly the following morning.

The sea post office is only one of a number of plans adopted by the United States post office department in facilitating the movement of foreign letters. United States postal officials invariably dispatch the transatlantic mails by the fastest available steamship, whatever its nationality, say the steamship men, and do not hesitate to suggest changes to the carriers when these will make an improved service. For example, one line, to meet the convenience of the post office department, has just changed the time of departure of its steamers from New York from 10 o'clock Wednesday morning to Saturday at 9:30. As a result, the Saturday mail for London, naturally the heaviest of the week, will be delivered in that city by special train from Southampton about noon of the following Saturday, in time for distribution on that day. It will be possible now in cases of importance to send a letter from New York to London and receive a reply in fourteen days. The Wednesday mail does not suffer by the change, since the post office department has arranged to equip the White Star ships sailing on Wednesdays with sea post offices.

At the present time there are five mails a week from New York to London and transatlantic mail is sent from this port by British, German, French and American ships. In strong contrast to this is the system followed by the British postal authorities. The policy of the Britons seems to be to use the ocean mails as an instrument to help purely British shipping lines at the expense of those controlled by foreigners. As a result, there are only two regular mails a week from London to New York, on Wednesday and Saturday, instead of five as in the opposite direction. The westbound steamship facilities are, of course, as good as the eastbound. The British authorities will forward letters by German and American liners if specific directions to that effect are written on the envelope, but this is a cumbersome system, involving the constant consultation of sailing lists and one that few correspondence will take the trouble to employ. Broadly speaking, in some cases, letters mailed in London on Wednesdays, too late to catch the Queenstown boat must wait over until Saturday, and those mailed between Saturday and Wednesday do not depart until the latter day. The British department has repeatedly dispatched mail to this side by vessels as slow as 17 knots. A comparison of the mail services in both directions between New York and London reveals the fact, say men who know, that week by week or month by month the time of westbound letters in reaching their destination is more than a day greater than the time of those traveling in the opposite direction.

BATTLESHIPS MISSISSIPPI AND IDAHO.

Secretary Moody has approved a circular to govern contracts for two 13,000-ton battleships to be known as the Mississippi and Idaho. The maximum time allowed for completion is forty-two months. There are to be two trials, one for speed and one for endurance. In each case the speed must be 17 knots, and less than 16 knots will result in rejection. Penalties are to be exacted for failure to attain 17 knots speed where the vessel makes more than 16½ knots. The general dimensions of each ship are as follows: Length, 375 ft.; breadth, 77 ft.; mean draught, 24 ft. 8 in.; total coal bunker capacity, 1,750 tons. The armament will consist of four 12-in., eight 8-in., and eight 7-in. guns, two 18-in. submerged torpedo tubes in the main battery, and twelve 3-in., six 3-pounder, four 1-pounder, two 3-in. field pieces, two machine guns and six automatic guns. The armor and protection will have a total weight of 3,323 tons. The engines will be of the vertical, twin-screw, three-cylinder triple-expansion type, with a combined horse power of 10,000. There will be eight water-tube boilers.

GUGLIELMO MARCONI, THE PRACTICAL.

George W. Fishback in American Industries.

It is characteristic of most inventors that they dream dreams which others must make come true. They have visions of great mechanical achievements which will revolutionize the world's business; yet they do not themselves know how to construct the necessary machinery for the operation. Marconi, of world-wide wireless telegraph fame, is an exception. He has dreamed dreams, but he has seen them come true because of his almost superhuman effort; he has had visions of the annihilation of distance and time, the two great obstacles of the world's progress, and he has devised with his own hands the apparatus by means of which he has brought this end about. In addition to being the student and solver of abstruse scientific problems, he has become the manufacturer of concrete things; his inventions have stepped from the stage of laboratory experiment to that of an enterprise world wide in its embrace. And this man, Marconi, who has achieved in such a manner as to win the plaudits of kings—and of common men—who has linked the hemispheres through a medium a millionth part as dense as the air we breathe, is a Scotch-Italian citizen of the world not yet thirty years of age.

Some historical novelist may some day write the romance of the accomplished daughter of a wealthy Dublin manufacturer and her dashing young Italian lover. The Dublin manufacturer sent his daughter to Italy to complete her musical studies. How she was wooed and won is a story still to be told; but these two, Anne Jamison and Guiseppe Marconi, are distinguished now as the parents of Marconi, of wireless fame. It is not of greatest interest to know that their elder son, Guglielmo, was born in Marzabotta, on his father's ancestral estate, Villa Griffon, near Bologna, Italy, on April 25, 1874, yet that is the first biographical fact to record concerning him. He was educated mainly by tutors and grew up much as any other Italian boy of his time. He did not regularly attend any college or university; he had some schooling in Leghorn and Bologna, and spent two years in school at Bedford, England, when a young boy. The important fact is that when the young man had reached the age of twenty he was already an inventor, and that, at this early age, he manufactured an apparatus by which he sent signals through the walls of his father's house without the use of any connecting wires.

It was this date, December, 1894, that began his career. He had previously read of the work of Hertz on electro-magnetic waves, and when he thought of using Hertzian waves for wireless telegraphy he had the foundations of his present success. In the next few years Marconi made thousands of experiments. Each step was carefully taken, and when he went to England in 1897, he was prepared to send messages five miles. Fortunately, he had considerable wealth of his own for his early work; but when he began important developments in England, his friends foresaw the necessity of a business corporation behind him, and an English company was organized. His continued success caused the stock to be over-subscribed, and soon it rose to four times its par value. Marconi went on with his experiments; from five miles he increased the efficiency of his apparatus to eighteen—the Isle of Wight to Poole harbor; then followed in rapid succession the triumphs of across the English channel, a service on the Goodwin Sands lightship, by means of which several lives were saved in one year; 86 miles from ship to ship during the English fleet maneuvers, reporting the international yacht races off Sandy Hook, contracts with Lloyds for fifteen years, service established on over thirty transatlantic liners, messages from shore to ship, 1,550 miles; from Italy to England; from England to the Baltic, and, finally, from Cape Cod, Mass., to Poldhu, England, 3,000 miles.

These tremendous results were not brought about, however, without further commercial developments. A continental company was formed in Europe by leading Belgian, German, French and Spanish financiers, and last year it became apparent that the forthcoming establishment of transatlantic wireless service would make an American company necessary. Accordingly the Marconi Wireless Telegraph Co. of America was formed. It purchased the entire Marconi rights in the United States and its dependencies, covering Cuba, Porto Rico, Alaska, Hawaii and the Philippines. During the past year it had constructed the transatlantic station at Cape Cod, Mass., a Marconi school at Babylon, stations at Chicago and Milwaukee, a ship reporting station at Sagaponack, L. I., installed the system in several steamships, and began work in Cuba and Alaska.

As the system stands today it is an art of communication which has spanned wirelessly a distance of something over 3,000 miles—from Cape Cod, Mass., to Poldhu, England. It has been used daily between Glace Bay, Nova Scotia, and Poldhu, 2,400 miles, transmitting a service of news for the London Times from Canada and a variety of messages besides. It is now a matter of a comparatively short time when the Cape Cod station will be put in daily operation, and soon thereafter commercial wireless telegraphy between the United States and England should be an accomplished fact. Not to go too far into the future, the Italian government has appropriated $150,000 for the erection of a station on the Italian coast, designed to communicate with Buenos Ayres—a distance of 5,000 miles! Work has already begun on the Italian long distance station, and the confidence of the Italian officials in the success of the project is sufficient reason for its mention here.

While Marconi's long distance achievements are the more sensational, the applications of his system to the business of the world in many other channels must not be lost sight of. In Europe the system has been adopted by the British and Italian navies; thirty-two installations have already been placed on the warships of England and twenty on the ships of Italy. England has over twenty land stations and Italy five. The great shipping association of Lloyds has made a contract with Marconi which has yet thirteen years to run, by which the system is being applied in such Lloyds stations as may be desired. Already several installations have been made and others are now under way. These stations facilitate the business of the association by reporting ships many hours ahead of their arrival, by communicating one to the other in case of wrecks or other necessity, and by making meteorological reports which reduce greatly the dangers heretofore attendant upon the shipping trade. In England, the center of business control for the system, there are twenty coast stations, as well as an interior station at Chelmsford, where is located a wireless telegraph school and factory. The channel boats plying between Dover and Calais are equipped with the system. On the continent there is at present much activity in the practical application of Marconi stations. Plans are under way by which the Belgian railways will take up the system, substituting it for other forms of signaling and using it for the prevention of wrecks. Until recently the German government excluded Marconi from its territory, but not long since it was proposed to consolidate the wireless telegraph interests in Germany, now operated by two or three firms whose developments of the system have extended mainly to the manufacture of wireless instruments, and to make a working alliance with the Marconi system, so that messages can be interchanged. The fact that the Slaby-Arco system, operated for a time on some of the ships of the Hamburg-American line, did not prove effective and was replaced by Marconi installations probably had considerable to do towards the movement to form an alliance with the Marconi system in German territory. In France the system is being tried, though not to a large extent beyond its application to the channel boats. The czar of Russia has shown his interest in the system and the recent achievement of sending a message from St. Petersburg to England, across a great deal of land, has brought out very prominently the need for the application of the system in the Baltic and North seas. Already work is under way for the linking of the continent with Iceland, between which there is now no form of communication, except by ships which ply in the summer season.

This brief resume of the present status of the Marconi system is in itself a promise of its accomplishment in the future; yet if a new discovery of science can come to such a state of commercial application in the short space of ten years, it would be difficult to predict its applications to the work of the world at the end of another decade. In the light of past experiences may we not say that "wireless" will be generally used all over the world, on land as well as on sea and over seas? Two years ago no one believed that Marconi would be able to bridge the Atlantic. Now the Italian government is going ahead with plans which comprehend the bridging of a distance almost twice as far as that attained by Marconi's greatest record. There is no longer any doubt in the minds of those who have come close to Marconi that he will be able to accomplish the linking of any two points on the globe by the use of his system.

There is another feature in the promise of wireless which means much for the future of this system of communication. Almost up to the present time few people have believed that Marconi would be able to use two installations of his system in the same range of electrical wave influence; that is to say, it has been generally believed that two stations in the same locality would confuse one another. Marconi has been working on this problem for the last four years. He found, in 1899, that he could tune his system for short distances, and since that time he has been able to devise instruments which were commercially available. It is now more than a year since he demonstrated to Lord Kelvin, Professor Fleming, and others, the "tuned" system. He caused two of his stations to communicate with a third at the same time, one of the sending stations transmitting a message in French and the other one in English. Both messages were received at the same time on separate instruments without error and without confusion of any kind. Now comes the announcement that Marconi is working on much more important developments of "tuning," and that he will now be able to apply these new devices to his installations here, insuring absolute secrecy to his messages.

"Consider," said President Eliot of Harvard, recently, "the imagination which resulted in the transmission of thought over a distance of 3,000 miles without any visible means of connection!" That accomplishment by Marconi is the most wonderful achievement which has taken place in the past fifty years; and who shall doubt the future of the system which he is building up for the accomplishment of commercial business in all parts of the world? Wireless telegraphy is not a dream; it is not a vision of the electrical enthusiast; it is a most positive, present-day accomplishment of the most tremendous importance.

The experimental tank of John Brown & Co., Clydebank, is now nearly completed. The canal is 400 ft. long, 20 ft. broad and 10 ft. deep and is covered by a shed 500 ft. long and 45 ft. broad.

SEEN AND HEARD ON THE LOOKOUT.

In a comparatively short time, let us say in 1920, large ocean steamers may be sailing through the Isthmus of Panama. In this connection it is interesting to note how maps have been altered and continents carved up by canals. The Suez canal finished in 1869 at a cost of $100,000,000, transformed Africa into an island. The Kaiser Wilhelm canal, completed in 1900 at a cost of $40,000,000, joined the North sea with the Baltic, and incidentally severed Denmark from Germany. The digging of these waterways is what the French would call *"un fait accompli."* Many other canals, some of immense proportions, have been decided upon, while others have as yet only made their appearance in the imagination of daring engineers. Among the latter may be mentioned one that would cut the continent of Europe in two. This canal, with which it is proposed to join the Baltic and the Black sea, would enable Russia to send her warships the entire length of her own territory. At present Russia is forced to maintain two distinct fleets. With the canal that is talked of her naval force on the Black sea can join her Baltic men-of-war in six days. Though the canal's length is computed to be fully 1,000 miles, an experienced Belgian engineer states that, as the country to be traversed is flat and marshy, the cost of digging it would not surpass that of the Suez canal. In almost every country the question whether to dig or not to dig has been answered in the affirmative. Holland may be called one of the exceptions. In the country which, according to Voltaire, contains only *"canaux, canards et canaille,"* canals are so numerous that no room can be found for more of them, and, ungently in need of land, the Dutchmen are hard at work converting the Zuyderzee into farms. On the other hand, part of the great desert Sahara may be reclaimed by letting in the waters of the Mediterranean. Though most of the Sahara's surface is situated above sea level, part of it might be made into a sea of thousands of square miles in extent. Let the good work go on.

The term "standardization" is often heard of late. A manufacturer of watches, making the several corresponding parts of his product of exactly the same size, was said some time ago to have "standardized" his business, and in smaller manufactures the value of standardization had long been acknowledged, but now even such gigantic enterprises as railroads are expected to follow this plan, so that any piece of machinery of their locomotives can be immediately replaced by stock on hand; or parts of their rolling stock kept at the different shops for freight cars that become disabled. Nowhere, however, is standardization more rigidly adhered to than in the German navy. German warships are built in groups, each group being made up of craft identically alike. It is stated that the principle of uniform group building is considered so advantageous that improvements have been rejected for the last vessels launched to make up a group. In naval wars of the future the contesting powers may possibly have at their coaling depots full sets of engines, as well as important parts of machinery for their several groups of men-of-war. On account of the continued activity among inventors, however, predictions regarding naval battles, even of the near future, are hazardous. Two powers may be fighting in midair presently, to decide some boundary question on the moon.

Talking about navies, the following appeared in the Hamilton Spectator: "Canada is not yet ready to throw away the prestige of John Bull's gunboats and depend entirely upon the Petrel." Having never contributed anything to the maintenance of said gunboats it is hard to see what "prestige" Canada can possibly derive from them. No European nation would dream of attacking Canada apart from her connection with Great Britain. Canada has no more reason to be proud of Great Britain's navy than, say—Brazil. The Petrel, however, is theirs, and while as compared with the naval force of other lands this one boat seems insignificant, Canadian papers should be the last to see cause for ridicule. It is only natural that the average person prefers dry bread from his own table to a repast served upon another's mahogany. Here's to the Petrel! long may she float!

F. H.

CONDITION OF BRITISH STEEL INDUSTRY.

London Daily Express.

Among the more important industries of Great Britain which have of late been seriously affected by our present fiscal system of so-called free trade, none have greater reason to complain of being sacrificed on the altar of an ancient fetish than that of iron and steel manufacture. If existing conditions should be continued no trade has more reason to dread the future. Whether it be the northern maker of ship steel or pig iron, the Derbyshire pipe founder, or the South Wales tin-plate-bar producer—all have the same tale to tell of unfair competition from abroad in their domestic markets. In order to realize the huge and rapidly-growing import of foreign iron and steel into this country, it is only necessary to state that whereas the quantity in 1900 was 761,402 tons, for the first eight months only of 1903 it had reached the total of 817,537 tons, an equivalent of nearly 1,250,000 tons per annum, and this without taking into consideration the probability of a further increase from now until the end of the year.

By far the greater portion of this large quantity came from Germany, as America has had enough to do latterly to satisfy home requirements. But the Steel Corporation's London agents have recently been instructed to take orders in this country. Every thinking Englishman who has been to the States and has studied American conditions will tell you that competition from that quarter is to be feared more than from Germany. In fact, what is there under existing fiscal conditions to prevent our present annual import of 1,250,000 tons being increased to 3,000,000 or 4,000,000 in the not very distant future, or, indeed, to prevent the British steel trade from being wiped out altogether?

It will be of interest to deal with the actual position of the steel trade today in such an important center of manufacture as South Wales and Monmouthshire, a district which possesses two of the most necessary natural qualifications for the economic production of iron, namely, proximity to the seaboard and to fuel which in quality is probably unsurpassed the world over. Let us discover why its manufacturers as a whole are unable to hold their own in the large market at their very door. Although the steel productions of South Wales comprise railway material, which is an important branch of manufacture at several of the larger establishments, it is its principal product of a semi-finished steel known as "tin-plate bars" which comes mainly within the scope of this article. Until 1898 tin-plate and galvanized-sheet manufacturers drew practically all their supplies of raw steel (in the shape of bars) from the local works; and, although prices waxed and waned according to the natural ebb and flow of trade, they never fell for any length of time to a lower point than that at which fairly up-to-date works could profitably produce them. Just when the recent trade boom had reached its zenith, however, cargoes of American bars first made their appearance in the district, and were freely offered at £2 ($9.73) per ton under local quotations. The result of this was complete demoralization of the market. Owing to the high values of fuel, ore and pig iron then ruling, local steel makers were quite unable to meet the competition.

Although, of course, prices have fallen all round considerably since that time, this relative condition exists today and is gradually growing worse. The only difference is that German competition has entirely supplanted American during the last two or three years—for reasons already stated—and the extent of the imports may be gauged by the fact that the port of Newport alone has this year received an average of 18,055 tons per month of foreign bars and billets, the exact quantity for August, 1903, being 21,658 tons, as against 7,965 in the same month last year. The prices of these bars fluctuate considerably, and even for brief periods have approached those or the home producers. As a general rule, however, the foreign material has been sold in South Wales at anything from 5s. ($1.22) to 12s. 6d. ($3.04) per ton under the figure which Welsh makers could afford to accept.

There is an additional factor to be reckoned with in competition from Germany, and that is the preferential rates granted by the state railways on iron, steel and other goods destined for export, and which practically amounts to a small government bounty. Railway rates as a whole, however, are decidedly lower there than in England, and with this further rebate will be remarked another advantage the German exporter has over his British rival.

Now, the effect of all this upon the British steel maker is not difficult to estimate. He is simply being gradually driven out of the market—some works are stopped or running short time, men are out of employment, and even tin-plate makers and other consumers of this and similar semi-finished material, who themselves own steel works, have found it more profitable at times to close down the latter and buy German bars and billets. This renders capital unproductive and prevents workmen from obtaining their full wages.

Unless some powerful assistance in the shape of fiscal reform is forthcoming the trade must rapidly decline; and a little later still, dependent industries, which doubtless now consider themselves more or less impregnable from outside attack, will find that our Teuton friends (who will then be practically controllers of their raw material) will be able to deal with them piecemeal in the same way, sending the finished article instead. Thus would pass away an important trade, which, in conjunction with other valuable industries, has contributed so largely to make Britain what she is. And without such industries she would undoubtedly quickly fall to the level of an agricultural state.

BALLIN THINKS LIMIT OF SPEED IS REACHED.

Herr Ballin, a director of the Hamburg-American Line, who is now in this country, said in New York recently:

"This is my annual trip to inspect the property of the company and to see how things are going on here. Our contract of amity with the International Mercantile Marine Co. extends twenty years. If the company has not been a success thus far it is because 75 per cent. of its fleet has been engaged in the Atlantic trade, which has been much demoralized in the last few years. The situation has not improved, but I believe it will improve, and I believe that the company finally will be successful. I believe the limit of speed in the present type of transatlantic ships has been reached in the Deutschland. The limit on such a voyage as we just completed, a very rough voyage indeed, was 22.23 knots. Do I believe the turbine applied to the Deutschland type of ship would make her faster? The installing of turbine engines in a craft of the Deutschland's size would be a step in the dark."

A DEVIATION CORRECTED.

Editor Marine Review: I regret that our friend Mr. John Maurice has deviated somewhat on the shipping question. I had supposed his compass to be a reliable one. His dislike of the tariff—the "high tariff" he calls it—is mere prejudice any way. If we had never protected the industries of the United States, and never thus "raised the price of labor," and never thus attracted immigration, does any one think Mr. Maurice would now be here in this land of monopolies finding fault with our government? Would he not be in the land of one Joseph Chamberlain, and his voice and pen be helping him to change British policy from free trade to protection? One cannot always guess these things aright, but certain it is that there is no excuse for any person in this country, at this late day in shipping discussion, charging the tariff —or the "high tariff"—with destruction of our foreign carrying trade. Were this true, reductions of the tariff and the lowering of wages should act to promote ship building and navigation. That this has been the case history say *not*—the writer knows personally that the reduction of tariff in 1846 and again in 1857 gave both these interests a blow on the head that it took years to recover from. He was broken up in business (ship building) both times.

As to the importation of cheap ships Mr. Maurice should ponder the remark of David Ricardo, the great free-trade advocate, in a speech in parliament, May 15, 1848, that "it was a singular circumstance that although the American vessels were the dearest-built and dearest-manned ships in the world, they had two-thirds of the whole trade between this country and the United States; while the Russians, with the cheapest ships in the world, were obliged to give up the whole trade between their country and ours"—(to British vessels). Several countries get their ships at the same price as the British—being built by or bought from them—and man them with hands at half the British wage and keep, yet the British ship is in no danger from the competition. The cheap ship and cheap crew of Italy and Spain, does not gain the mastery from the British in the world's carrying trade.

Then, as to ship material, beginning in 1870 the tariff has been taken off of it for building vessels for *foreign* trade. Some years ago, at Bath, a ship for this trade was built entirely of imported stuff, but one trial was enough to condemn the plan as disadvantageous. Our own material is better and easier obtained. Theory must pan out in practice or be set aside by practical men.

The subsidy cog for American shipping is no better than the tariff cry in character; there is nothing in it for the *general* marine. We did not lose our carrying trade for want of cheap ships, cheap materials, or subsidies or bounties. *By a change of policy* we simply gave away what we held in hand. We opened our foreign trade to foreign vessels, the same as we might open our domestic trade to foreign vessels. Were this last thing done tomorrow it would be no more foolish than to pass the act of May, 1828, opening our ports to foreign ships with cargoes from every part of the world, and giving ships and goods the same footing as if under our own flag. England was not doing this at the time, nor did she until after 1849. Over 42 per cent. of our foreign trade today is carried by foreign ships to and from countries *not their own*. Our laws needlessly give this trade to them. *It belongs to our own vessels.* We were free to give it and we may be free to resume it, it we will. For this no subsidy is necessary, no subsidy would be effective. Discriminating duties will be effectual; if not, then exclusion will be in order.

WILLIAM W. BATES.

Denver, Col., Nov. 12, 1903.

HOT BEARINGS.

By Horace See.

We are continually in receipt of information about vessels whose performance has been marred by hot bearings at that most important part of the steam engine—the main crank shaft. The remarkable feature of the reports is the varied causes assigned to these troubles and the numerous methods suggested to overcome them. They are also supposed to be inherent in a new engine and must be passed through by it the same as the measles and the other early diseases are by a child, as we frequently hear the expression "she will be all right when she wears down to a bearing," meaning that the journal and bearing working together will in some mysterious way change the form from bad to good. This expression would not be used if a little thought were given to the matter and the mind brought to consider the impossibility of a true surface bringing an untrue one up to a true condition. The error may be modified by the one losing some of its truth in partly correcting the want of it in the other but the true form can never be attained in this way. We must start with the perfect journal and bearing if we really desire freedom from that most annoying and damaging condition—a hot bearing.

How much disappointment has fallen on the owner of the vessel and how often his plans defeated by this occurrence, how much money has been spent in blindly trying to correct it and how much the reputation of the builder has suffered that could have been avoided by employing methods certain to insure freedom from such a misfortune.

The late English Naval Maneuvers, where the best and newest battleships and cruisers had much trouble and where some disorganization of movements was occasioned by hot bearings, illustrate the seriousness of such a condition and stand out as an example of what bad methods and workmanship will bring about when least desired, and what disaster may follow in their wake.

On the other hand we have an example of the value of correct methods and good workmanship in the Oceanic Steamship Co.'s steamer Alameda, as noted in the London Journal of Commerce and in the Marine Review of Sept. 14, 1899, these journals stating that she is an eloquent testimonial of good work and a feather in the cap of American ship builders, having in all her journeyings from the time she left Philadelphia in 1883 run over 1,000,000 miles, and that during the sixteen years it took her to cover this distance she had not stopped at sea ten hours all told for repairs. She has never been late, but frequently ahead of time, and there has never been an occasion when her mail failed to overland on schedule time. These reports were made after the Alameda had completed her sixtieth round trip to Australia, on which route she was not placed until after having made twenty-five round trips between San Francisco and Honolulu. The same methods have been employed in the construction of the machinery of all vessels superintended by me since that time, whereby uniform and equally-good results have been obtained. Amongst these may be mentioned the yacht Atalanta, steamer Monmouth, which has held the position of pacemaker in New York harbor for the past fifteen years, the ships of the Red "D," Metropolitan and Morgan lines, the cruisers Yorktown, Vesuvius, Philadelphia, Eagle, etc. Leads could be taken off these engines at any position of the crank with the same showing—those from the main bearings as close as No. 30 and the crank pins No. 33 B. W. G., without any heating on the first day steam was on the engine, as well as on subsequent trials and runs, no matter how hard they were pushed.

The comfort thus assured to the engineer, the absence of extraordinary repairs and the saving of oil is a return far greater than the extra time taken and money expended in making a success of what might otherwise and very often turns out to be a failure. The term "good enough" should be abolished by all engine builders and that of "perfect" substituted, as no work is too good for this important part of the engine.

New York, Nov. 12, 1903.

EFFICIENCY OF BELLEVILLE BOILERS.

Corroborative evidence of the efficiency of the Belleville boiler is not difficult to obtain these days. The wonderful record of the British cruiser Spartiate has silenced the critics. A correspondent of the Glasgow Herald writes:

"The reports which have recently been received regarding the working of the Belleville boiler are, I learn, remarkably favorable, and I take the liberty of quoting from a private letter that I have received on this question from an engineer, whose name, were I free to give it, would invest his spontaneously-expressed-opinion with considerable weight. I quote the remarks as they were written, although they were not intended for publication; they should do something to restore confidence: 'I think you know our opinion—certainly mine—that there is nothing wrong with the Belleville boilers. All that is required is that they shall be well made and of good materials; that the engineer in charge shall know how the boiler is constructed and put together, and that the thing as made requires looking after; and last, but not least, that the men who put the coals on the bars are stokers—not men who have never before shoveled coals into a boiler in their lives. We have put 100 boilers through our hands, and we have never had a moment's trouble or a single failure of any kind. When the evaporating tests (three days in the works) are on, it is a lesson that all your writing friends should see, after which they would never say one word against Belleville boilers.'"

EXPORTS VALUED AT $5,000,000 A DAY.

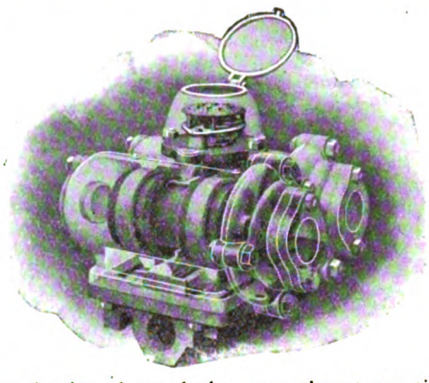
Five million dollars a day is a snug sum for the people of a single country to realize as the sale of the products of their farms, factories, forests, fisheries, and mines. The exports of domestic products of the United States in the month of October, 1903, averaged more than $5,000,000 for every day in the month, and for every business day in the month averaged practically $6,000,000 a day. The total exports of the months, as shown by figures of the department of commerce and labor amounted to $160,370,059. From the port of New York alone the exports of the month were $51,867,942, or nearly $2,000,000 for each business day of the month. This exportation exceeds that of any preceding month in the history of our commerce with the single exception of October, 1900, when the total was $163,389,680. For the ten months ending with October the total exports were $1,149,694,933, and for the twelve months ending with October the total was $1,422,887,954. These totals for ten and twelve months, respectively, are larger than in any preceding year except 1901 and 1900, in which the ten and twelve months' totals slightly exceeded those of the present year. The largest single item was cotton, which in the month of October amounted to $60,000,000.

Tests will occur this week in Narragansett bay between the Protector, the first of the Simon Lake type of torpedo boat, and the Fulton, one of the Holland variety. The tests will take more than a week and will include the following features: Speed trial light, awash, submerged; maneuvering ability; speed of diving; torpedo firing; radius of service under the boat's own power; habitability and seaworthiness.

WATER METER FOR BOILER EVAPORATIVE TESTS.

By John A Drew.

Every engineer who has control of a boiler plant must feel the necessity of having some simple device by which the amount of water fed to the boiler can be accurately measured. With such an appliance at hand, it becomes an easy matter to test the evaporative values of various coals with a view to determining which of the several is the most economical in developing power. There was a time when it was not necessary to keep a close record of the cost of operation of large power plants, but now the ever-increasing competition and the necessity of lowering the cost of production demand the very closest scrutiny into every possible source of economy. With the introduction of electricity and the consequent installation of large central power stations, and in large manufacturing establishments where the cost of power is an important item in cost of the product, a very careful record should be kept of the performance of the boiler plant, and there are but few, if any, plants today that do not keep a close record of the coal consumption. But while this is valuable information in itself, it is only part of the data that should be obtained. If the amount of water evaporated is not known, there is no way of separating the performance of the boiler itself from the balance of the plant.



This separation is important, indicating as it does, the efficiency of the boilers. It shows when the boiler is affected by scale or soot and determines the most economical fuel, as well as determining the best method of firing, either by hand or by mechanical stokers. In the past, the customary method of determining the amount of boiler feed water has been by weighing or measuring it. This is a very laborious method, even for short tests, and is utterly impracticable for daily work. The use of the feed water meter, on account of its simplicity, accuracy and reliability in evaporative tests, is now most universally adopted by engineers for daily work, as well as for trial tests.

The most reliable test meters are of the positive displacement type, the best known of which is the duplex pattern measuring water by the means of two chambers alternately filled and emptied by the motion of their pistons. These meters are so constructed that it is impossible to pass water without a corresponding registration, for in order to pass through the meter the water must be displaced by the motion of the pistons and therefore recorded by the counter attachment. The pistons are closely fitted and move in parallel lines. The design, arrangement and construction of valves and parts is such that the strokes of the two pistons alternate, the valves actuated by one admitting pressure to the other. At the end of each motion, the pistons are brought to rest by adjustable buffers which determine the length of the stroke. One of the pistons is constantly in motion, giving uniform flow of water, free from pulsation or shock. The meters are perfectly noiseless in their performance. These test meters are designed and constructed of materials uniformly affected by expansion and contraction in passing water of varied degrees of temperature, thus further assuring their accuracy as measuring devices.

For an ordinary test, one of these meters was calibrated. By deducting the weight of water as found by the meter registration from the actual tank weight, the figures showed the meter to be correct to within one-fifth of one per cent. This is considered a very satisfactory showing for ordinary every-day work. To obtain correct results, these test meters should be properly applied for operation, the size selected should be ample for the service, insuring slow piston speed, and pipe connections should be made so that at any time the meter can be cut out for examination or repairs without shutting down the boilers.

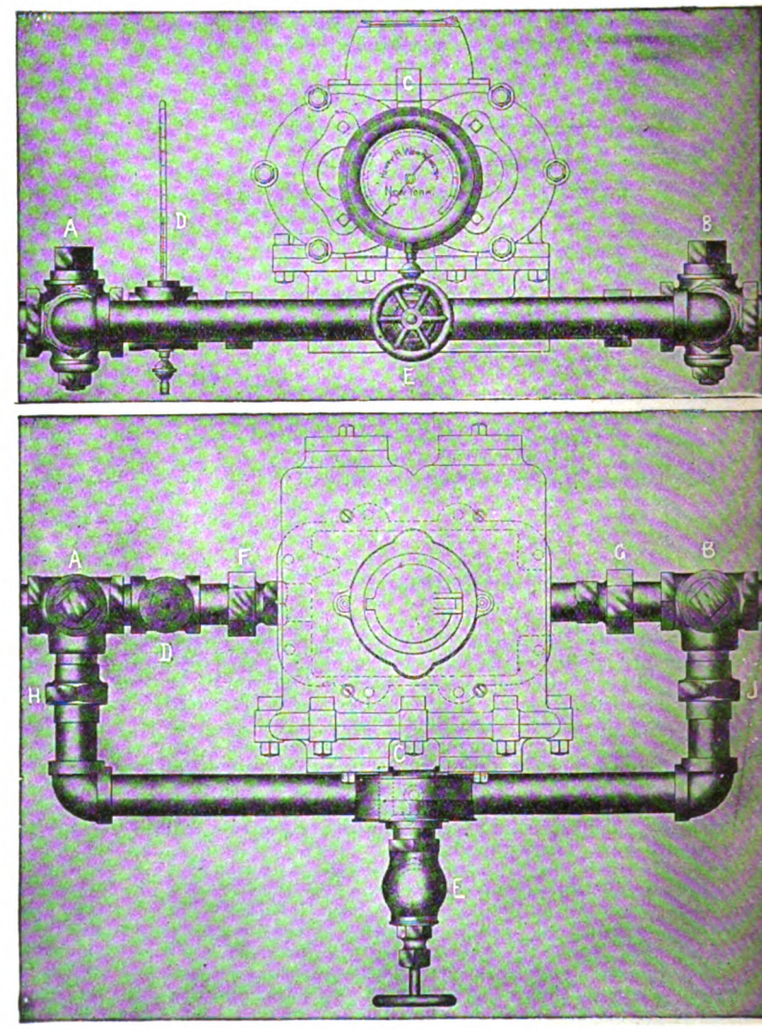
The accompanying cut, loaned to us by Henry R. Worthington, shows the plan and elevation of a test meter with its pipes and connections, as applied to boilers for test, or for every day record. A and B are three-way cocks to pass water through the meter and to the boiler, or, for calibration, to allow water to pass by the angle valve E to a tank placed on scales for weighing. By this arrangement it is possible to test the meter as frequently as desired. By setting the cocks A and B and breaking the couplings F and C the meter may be removed without interrupting the operation of the boiler plant in any way. C is a gauge for indicating pressure; D is a thermometer for indicating the temperature of the water; H and J are pipe couplings. These connections should all be made of brass.

By this it will be observed that a correct record of boiler efficiency can be kept with accuracy by the use of a test meter. In fact, in these times when the saving of fuel is looked for in every direction, its use is indispensable to good management and economic operation of moderate size, as well as large, boiler plants.

STONE-LLOYD SYSTEM OF BULKHEAD DOORS.

If it is admitted that a ship can be divided up by watertight bulkheads into so many compartments that she could still remain afloat though two were filled, then it is possible to make that ship unsinkable, even by an accident which admits more water than can be pumped out. It is evident that all the bulkhead doors being open just before collision, they must be all closed at, or immediately after the hull of the ship has been pierced. It is because this sudden closing cannot be carried out in practice, unless the ship be fitted with some system of safety doors, that ships are sunk. Last week one of these systems of automatic bulkhead doors, which is fitted to the Hamburg-American liner Deutschland, was inspected at Southampton.

The system on the Deutschland is known as the Stone-Lloyd. It is claimed that by this system all the watertight doors in a ship can be closed in a few seconds, either individually or collectively, from the captain's bridge or any other convenient point, and that should this precaution be neglected, the entrance of water into any one or more compartments would automatically close the bulkhead doors in those compartments. A warning bell sounds before the door commences to descend. The door descends gradually. It can be arrested in its descent, or raised or lowered by means of levers placed close to it on both sides of the bulkhead. Thus there is no fear of a member of the crew being maimed by its sudden lowering or finding himself trapped in a flooded compartment. In the event of sudden mishap, say a collision, the officer in charge on the bridge, by the mere moving of a lever, sounds warning bells throughout the ship, and at the same time releases the action which sets all the bulkhead doors in motion. Within a few seconds all are effectively closed. Should members of the crew be shut in a compartment they have but to move the lever placed at each door on either side of the bulkhead



to cause it to open and let them through, the door closing automatically behind them. They cannot leave it open. Should the officer in charge fail to close the bulkheads, any inrush of water would automatically effect the closing of the doors in the compartment or compartments invaded. The Stone-Lloyd system is operated entirely by hydraulic power. The pressure is stored in accumulators, and is always available.

TRADE NOTES.

The Lozier Motor Co., 1 Broadway, New York, is issuing a monthly magazine called the Propellor, published in the interests of the Lozier gasoline launch company.

The Wellman-Seaver-Morgan Co., Cleveland, which owns and operates the Webster, Camp & Lane plant at Akron, has removed the engineering and drafting departments of that plant from Akron to Cleveland.

The marine department of the Standard Oil Co. is introducing "vacuum storm oil" for quieting the waves. The efficacy of oil on waters has been known since biblical times but it is only of late years that it has really been taken up by navigators.

A. G. Hathaway & Co. of Cleveland, which has the agency of the Pittsburg Piston Packing Co. for the district, has placed some large orders with prominent concerns in Cleveland. This packing acts as a flexible joint, lubricates the piston, will not cut out the rod and is guaranteed for from one to two years.

A comprehensive catalogue has been issued by W. H. Mullins, Salem, O., descriptive of Mullins' stamped and embossed sheet metal boats. Of them the catalogue says that they are original in design, perfectly stiff, staunch and watertight and are practically non-sinkable The boats are carvel-built and are consequently smooth-skinned. The catalogue is excellently illustrated with photos and wash drawings of the boats, which are, indeed, very reasonable in price.

No concern gets out more costly or more elaborate catalogues than the Buffalo Forge Co., Buffalo, N. Y. Especially is this true of an illustrated catalogue on mechanical draft apparatus. Stating briefly the considerations which have led to the use of the fan for mechanical draft they are: First cost; economy in operation under any load, light or heavy, within the capacity of the boiler; increased efficiency in steam generated per pound of fuel; close automatic regulation of steam pressure carried on the boiler; and adaptability in form and proportions to use any available space. The catalogue also contains cuts showing various types of Buffalo mechanical draft fans and engines for driving them, with illustrations from photographs of installations in operation.

The United Telpherage Co., Westfield, N. J., has just issued three bulletins devoted to the uses of telpherage in various forms. The most pretentious of the bulletins has to do with reserve coal storage. Of course an ample coal pile is a necessity for large manufacturing plants and is also an economical means of handling it. The bulletin describes how the telpher may command the storage yard and easily handle the coal. Coal can be removed and stored from any vehicle whatsoever. It can be removed from boats by unloading towers, either movable or stationary, of the standard type used for such work, or by means of projecting track. In this latter form the telpher must run out over the boats on the projecting track, and by means of its hoist and bucket take its load direct from the vessel. In case conveying alone is desired a telpher with a train of buckets is used, and after the buckets have been loaded from the hoppers in the towers, it travels to the storage yard, where the load is discharged, and then returns for another load. The hopper, which is higher than the telpher tracks, feeds the coal into the buckets, which are generally bottom dumping. The four buckets that constitute the train have a capacity of 2 tons each.

Two excellent bulletins have just been issued by the Fort Wayne Electric Works, Fort Wayne, Ind. The first bulletin, No. 1049, deals with direct-connected, direct-current generators. The company has a line of standard direct-current generators for direct engine connections in sizes from one-third kilowatt to 800 killowatts' capacity, and for all standard lighting or power voltage. Among the operators of Fort Wayne engine-type generators are mines, railroads, brewers, cotton mills, warehouses, colleges, hospitals, lighting companies, rolling mills, department stores, engine builders, bridge builders, telephone companies, ice makers, cement manufacturers, steel plants and others not easily classified. A list is given of those now using them. The second bulletin deals with direct-connected, direct-current generators for power and lighting. The large field of light and power users supplied by the Fort Wayne Electric Works has resulted in the development of a line of direct-connected, direct-current generators that is exceptionally adapted to operation under extremely varied conditions. Mechanical details and refinement of electrical design have been given special attention by an experienced force of engineers and the requirements of actual service have been very successfully met in the line of type MPL direct-connected generators described in the bulletin.

Capt. Warren Sawyer, Millbridge, Me., will build a four-masted wooden schooner for Capt. G. A. Tunnell of Philadelphia.

ITEMS OF GENERAL INTEREST.

Contract has been awarded to the New York Ship Building Co., Camden, N. J., for the construction of five lightships for the lighthouse board. The congressional appropriation was $90,000 for each ship; the bid of the ship building company was $82,000 for each. They are to be completed within twelve months. The vessels are to be of steel and to be able to operate under their own steam.

Pittsburg is superseding Washington as the "fake" center of the country. The latest is that Secretary Cortelyou is to resign as secretary of commerce and labor to be succeeded by John Mitchell of the miner's union. This information sent broadcast throughout the country profoundly astonished President Roosevelt. Now the story comes that Henry C. Frick is to succeed Quay as senator.

Mr. Edward Gaskin, marine architect and surveyor of Buffalo, is at present retained by the Panama Steamship Co., as consulting and superintending engineer for the alteration and repair of two of their passenger steamers used in the South Atlantic trade, upon each of which they intend spending $150,000. This work, a six months' job, keeps Mr. Gaskin in New York nearly all the time of late.

Com'dr John A. H. Nickels of the training ship Topeka has been selected to command the new American coaling station at Guantanoma, Cuba. He will go there in the Topeka and take charge on Dec. 10, when there will be formal ceremonies appropriate to the transfer of the property to the United States. Rear Admiral Coghlan, commanding the Caribbean squadron, who will be present with some of his ships, will receive the property in the name of the United States government.

The board to choose the site of a naval training station on the great lakes has reported in favor of Lake Bluff, the place near Chicago where big camp meetings are held from year to year. Lake Bluff is 4 miles south of Waukegan and a similar distance from Lake Forest. The distance to Chicago is 32 miles. The fine boulevard from Fort Sheridan, when extended, will pass along one side of the proposed reservation for the naval station, which is to embrace 100 acres. The site will cost $90,000. It is expected that congress will authorize the expenditure of $500,000 on the station.

The National Machine Tool Builders' association at its annual convention in New York adopted a resolution declaring that there is nothing in existing conditions to warrant a reduction in prices and resolved to maintain the present schedule for machine tools. The following officers were unanimously elected: President, William Lodge, Lodge & Shipley Machine Tool Co., Cincinnati; first vice-president, W. P. Davis, W. P. Davis Machine Tool Co., Rochester, N. Y.; second vice-president, F. E. Reed, F. E. Reed Co., Worcester, Mass.; treasurer, Enoch Earle, P. Blaisdell & Co., Worcester, Mass.; secretary, P. E. Montanus, Springfield Machine Tool Co., Springfield, O.

FERROINCLAVE—NEW FIREPROOFING CONSTRUCTION.

Ferroinclave is a new ferro-concrete fireproofing construction which is being put on the market by the Brown Hoisting Machinery Co. of Cleveland and is the invention of Mr. Alexander E. Brown, vice-president of the company. This material should be particularly interesting to consulting engineers and architects because of its suitability for roofs, siding, floors, stairways, gutters and cornices for workshops, factories and industrial plants. The company has put out a beautiful catalogue descriptive of the new material, which it would be well for any engineer or architect to obtain. The description of ferroinclave is well aided in the catalogue by excellent reproductions of wash drawings and photographs. Ferroinclave is generally made of sheets of No. 24 or No. 22 box-annealed sheet steel. Each sheet is accurately crimped by special machinery into the dovetailed section. Each alternate dovetail opening at one end of the sheet is slightly wider than the same openings at the other end, and the openings at either end are alternately reversed, although they are of the same depth, namely ½ in. This allows the opposite ends of two sheets to readily slide into one another and fit securely. The two sheets wedge tightly on each other, giving a continuous girder strength through the joints. In other words, each sheet will shingle up under the sheet above it and down over the sheet below it, making the complete roof covering one homogeneous piece, watertight even before the cement covering is put on. It is a simple process to lay ferroinclave roofing. The sheets are laid directly on the purlins, which may be I-beams, channels, deck beams or any suitable section. The sheets are fastened to these purlins with a special clip, which grips the purlin and is riveted to the ferroinclave sheets at the joint. These clips are so designed that the ferroinclave will be fastened securely, and at the same time allow a cement coating ⅜ in. in thickness between it and the purlin. This allows a complete covering of cement under the sheet and prevents corrosion. Or an iron bar ⅜ in. by ⅜ in. is sometimes placed on top of the purlin for a roofing support for this same purpose. Ferroinclave siding is applied in the same manner as the roofing. The sheets are set vertically, or preferably horizontally, and are fastened by clips to the studding or girts. When possible it is advisable to punch 7-32-in. holes in studs and girts, so that the ferroinclave may be riveted directly to them, thus doing away with clips and making a more rigid construction. After the ferroinclave sheets are fastened in place the top or outside is coated with a mixture of one or two parts of sand to one part of best Portland cement, filling all the corrugations up to a height of ⅜ in. above the top. Every possible use to which ferroinclave can be put is very lucidly and faithfully described in the catalogue and it is well worth getting and preserving.

WINDLASS OF YACHT INGOMAR.

A windlass furnished by the American Ship Windlass Co. for the schooner yacht Ingomar, owner by M. F. Plant and built by the Herreshoff Mnfg. Co., is thus described:

"The windlass is of the horizontal pump-brake type, which is the most practical style of windlass, as the chains are taken on the wild-cats in a natural position. The windlass is entirely of bronze, with the exception of the side bitts, which are made of wrought steel to save weight. The beam bitt is removable, so that in case it is desired to take the windlass out at any time, all that it is necessary to do is to remove the bolts in the beam bitt and in the side bitts, and the windlass can then be rolled out of the bitts. The wild-cats are locked and controlled by improved friction locking gear. With this locking gear the wild-cats can be locked in any position, and they are controlled by a lever inserted in the locking ring, which throws the friction in or out as desired. Inside of each clamp is a friction shoe, which fits on each of the driving wheels and which prevents the toggle from wearing a groove in the wheel. There is no lost motion with this windlass. All the forgings are made of wrought steel, and the forgings and side bitts are galvanized. The rest of the windlass, being of bronze, is polished. Emery & Cheney elastic chain stoppers are provided, and the metal in same is also of bronze polished."

An interesting and instructive souvenir was presented to the members of the New England Foundrymen's Association on the occasion of their recent visit to the new foundry and pattern departments of the B. F. Sturtevant Co. at Hyde Park, Mass. This has been republished as Bulletin No. 54, a sixteen-page pamphlet, describing and illustrating these departments and particularly their industrial equipments. The removal of the foundry and pattern departments is the first step towards the removal of the entire plant from Jamaica Plain, Mass., to the extensive new works at Hyde Park.

As an indication of the development of ship building in the far east the China Navigation Co. has given an order to the Hong Kong & Whangsoa Dock Co., Ltd., for a light-draught, twin-screw steamer of the following dimensions: Length, 310 ft.; beam, 46 ft. beam; and 14.3 ft. draught. She will be the largest steamer ever built in Hong Kong.

Duck and quail hunters—Half-fare rates to parties of three or more traveling together on one ticket via Nickel Plate road to McComb and Payne, O., and points between those stations; also to South Whitley and Will Vale, Ind., and intermediate points. Tickets on sale Nov. 9 to 30, inclusive, good to return till Dec. 3, 1903. See nearest agent or address E. A. Akers, C. P. & T. A., Cleveland, O. 201, Nov. 30

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Elwell-Parker Electric Co.....Cleveland.
General Electric Co.....Schenectady, N. Y.
Lidgerwood Mfg. Co.....New York.
Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

ELECTRIC LIGHT AND POWER PLANTS.

Elwell-Parker Electric Co.....Cleveland.
General Electric Co.....Schenectady, N. Y.
Sturtevant, B. F. Co.....Boston.
Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

ENGINE BUILDERS, MARINE.

American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Bath Iron Works, Ltd.....Bath, Me.
Chicago Ship Building Co.....Chicago.
Chase Machine Co.....Cleveland.
Craig Ship Building Co.....Toledo, O.
Cramp, Wm. & Sons.....Philadelphia.
Crescent Ship Yard Co.....Elizabethport, N. J.
Dake Engine Co. .....Grand Haven, Mich.
Detroit Ship Building Co.....Detroit.
Fletcher, W. & A. Co.....Hoboken, N. J.
Fore River Ship & Engine Co.....Quincy, Mass.
Great Lakes Engineering Works.....Detroit, Mich.
Hall Bros. .....Philadelphia.
Jenks Ship Building Co.....Port Huron, Mich.
Lockwood Mfg. Co.....East Boston, Mass.
Macbeth Iron Co.....Cleveland.
Maryland Steel Co.....Sparrow's Point, Md.
Milwaukee Dry Dock Co.....Milwaukee.
Moran Bros. Co.....Seattle, Wash.
Mosher, Chas. D.....New York.
Moulton Steering Engine Co.....New York.
Newport News Ship Building Co Newport News, Va.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

ENGINE BUILDERS, MARINE.—Continued.

Northwestern Steam Boiler & Mfg Co., Duluth, Minn.
Risdon Iron Works.....San Francisco.
Roach's Ship Yard.....Chester, Pa.
Sheriffs Mfg. Co.....Milwaukee.
Superior Ship Building Co.....Superior, Wis.
Thropp, J. E. & Sons Co.....Trenton, N. J.
Trout, H. G. .....Buffalo.
United States Ship Building Co.....New York.
Warrington Iron Works.....Chicago.
Willard, Chas. P. & Co.....Chicago.

ENGINE ROOM TELEGRAPH, CALL BELLS, ETC.

Cory, Chas. & Son.....New York.
MacLean Hydraulic Signal Co.....Chicago.

ENGINEERING SPECIALTIES AND SUPPLIES.

Crane Co. .....Chicago.
Kieley & Mueller.....New York.
Lunkenheimer Co.....Cincinnati.
McCutcheon, C. H. .....Buffalo.
New York Belting & Packing Co.....New York.
Northwestern Steam Boiler & Mfg Co., Duluth, Minn.
Reilly Repair & Supply Co., James....New York.
Rippley Hardware Co .....Grafton, Ill.

ENGINEERS, MARINE, MECHANICAL, CONSULTING.

Garrett-Cromwell Engineering Co.....Cleveland.
Gaskin, Edward .....Buffalo.
Hunt, Robt. W. & Co.....Chicago.
Kidd, Joseph .....Duluth, Minn.
Logan, Robert .....Cleveland.
Matteson & Drake.....Philadelphia.
Mosher, Chas. D.....New York.
Newman, R. L. .....New York.
Pittsburg Testing Laboratory, Ltd.....Pittsburg.
Powell, Ambrose V.....Chicago.
Roelker, H. B. .....New York.
Sadler, Perkins & Field .....New York.
Wood, W. J. .....Chicago.

EVAPORATING AND DISTILLING APPARATUS.

Reilly Repair & Supply Co., James....New York.

FANS FOR VENTILATION, EXHAUST, ETC.

Sturtevant, B. F. Co.....Boston.

FEED WATER PURIFIERS AND HEATERS.

Learmonth, Robert.....Buffalo.
Reilly Repair & Supply Co., James....New York.
Ross Valve Co.....Troy, N. Y.

FIXTURES FOR LAMPS, OIL OR ELECTRIC.

General Electric Co.....Schenectady, N. Y.
Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

FORGES.

Sturtevant, B. F. Co.....Boston.

FORGINGS FOR CRANK, PROPELLER OR THRUST SHAFTS, ETC.

Cleveland City Forge & Iron Co.....Cleveland.
Fore River Ship & Engine Co.....Quincy, Mass.
Macbeth Iron Co.....Cleveland.

FLUE WELDING.

Fix's, S. Sons .....Cleveland.

FURNACES FOR BOILERS.

Continental Iron Works.....New York.

FUELING COMPANIES AND COAL DEALERS.

Hanna, M. A. & Co.....Cleveland.
Ironsides Dock & Coal Co .....Toledo, O.
Pickands, Mather & Co.....Cleveland.
Pittsburg Coal Co.....Cleveland.
Rochester & Pittsburg Coal & Iron Co.....Buffalo.
Smith, Stanley B. & Co.....Detroit.
Smith Coal & Dock Co., Stanley B.....Toledo, O.
Youghiogheny & Lehigh Valley Coal Co....Chicago.

GALLEY UTENSILS.

Siegel Cooper Co .....New York.

GASKETS, RUBBER.

New York Belting & Packing Co.....New York.

GAS BUOYS.

Safety Car Heating & Lighting Co.....New York

GAS AND GASOLINE ENGINES.

Chase Machine Co.....Cleveland.

GAUGES, STEAM AND VACUUM.

American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Lunkenheimer Co.....Cincinnati.

GRAPHITE.

Dixon Crucible Co., Joseph.....Jersey City, N. J.

GROCERIES AND SUPPLIES.

Siegel Cooper Co .....New York.

HAMMERS, STEAM.

Chase Machine Co.....Cleveland.

HEATING APPARATUS.

Sturtevant, B. F. Co.....Boston.

HOISTS FOR CARGO, ETC.

American Ship Building Co.....Cleveland.
Brown Hoisting Machinery Co., (Inc.)....Cleveland.
Chase Machine Co.....Cleveland.
Elwell-Parker Electric Co.....Cleveland.
General Electric Co. .....New York.
Hyde Windlass Co.....Bath, Me.
Lidgerwood Mfg. Co.....New York.
Marine Iron Co.....Bay City.
Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

HOLLOW STAYBOLT IRON.

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

HOSE, RUBBER.

New York Belting & Packing Co.....New York.

HYDRAULIC DREDGES.

Great Lakes Engineering Works..... Detroit.

HYDRAULIC TOOLS.

Watson-Stillman Co., The.....New York.

ICE MACHINERY.

Roelker, H. B. .....New York.

INDICATORS FOR STEAM ENGINES.

American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.

INJECTORS.

American Injector Co.....Detroit.
Crane Co.....Chicago.
Jenkins Bros. .....New York.
Lunkenheimer Co.....Cincinnati.
Penberthy Injector Co. .....Detroit, Mich.

INSURANCE, MARINE.

Brown & Co. .....Buffalo.
Elphicke, C. W. & Co.....Chicago.
Fleming & Co., P. H. .....Chicago.
Hawgood & Co., W. A. .....Cleveland.
Helm & Co., D. T. .....Duluth.
Hutchinson & Co. .....Cleveland.
McCarthy, T. R. .....Montreal.
McCurdy, Geo. L. .....Chicago.
Mitchell & Co. .....Cleveland.
Peck, Chas. E. & W. F. ..New York and Chicago.
Richardson, W. C. .....Cleveland.
Sullivan, D. & Co.....Chicago.
Weeks, F. H. .....New York.

IRON ORE AND PIG IRON.

Bourne-Fuller Co. .....Cleveland.
Hanna, M. A. & Co.....Cleveland.
Pickands, Mather & Co.....Cleveland.

LAUNCHES—STEAM, NAPHTHA, ELECTRIC.

Marine Construction & D. D. Co.....
.....Mariner's Harbor, S. I., N. Y.
Truscott Boat Mfg. Co.....St. Joseph, Mich.
Warrington Iron Works.....Chicago.
Willard, Chas. P. .....Chicago.

LIFE FLOATS.

Carley Life Float Co. .....New York.

LIFE PRESERVERS, LIFE BOATS, BUOYS.

Armstrong Cork Co. .....Pittsburg.
Carley Life Float Co.....New York.
Dreln, Thos. & Son .....Wilmington, Del.
Kahnweiler's Sons, D. .....New York.
Lane & DeGroot .....Long Island City, N. Y.
Marine Construction & Dry Dock Co.....
.....Mariner's Harbor, S. I., N. Y.
Rippley Hardware Co.....Grafton, Ill.

LIGHTS, SIDE AND SIGNAL.

Helvig, H. A. J. .....New York.
Russell & Watson .....Buffalo.

LOGS.

Bliss, John & Co..... New York.
Nicholson Ship Log Co. .....Cleveland.
Walker & Sons, Thomas .....Birmingham, Eng.
Also Ship Chandlers.

LUBRICATING GRAPHITE.

Dixon Crucible Co., Joseph.....Jersey City, N. J.

LUBRICATORS.

Crane Co .....Chicago.
Lunkenheimer Co .....Cincinnati.

LUMBER.

Martin-Barriss Co. .....Cleveland.
Moran Bros. Co.....Seattle, Wash.
Shurick, F. S. .....New York.

MACHINISTS.

Chase Machine Co.....Cleveland.
Lockwood Mfg. Co .....East Boston, Mass.
Macbeth Iron Co.....Cleveland.
Union Machine & Boiler Co. .....Cleveland.

MACHINE TOOLS (WOOD WORKING).

Atlantic Works, Inc. .....Philadelphia.

MARINE RAILWAYS, BUILDERS OF

Crandall & Son, H. I. .....East Boston, Mass.

MATTRESSES, CUSHIONS, BEDDING.

Fogg, M. W. .....New York.
Siegel Cooper Co .....New York.

MECHANICAL DRAFT FOR BOILERS.

American Ship Building Co.....Cleveland.
Bloomsburg & Co., H. .....Baltimore, Md.
Detroit Ship Building Co.....Detroit.
Sturtevant, B. F. Co.....Boston.

METALLIC PACKING.

Hayden Mfg. Co., N. L. .....Columbus, O.
Katzenstein, L. & Co. .....New York.
U. S. Metallic Packing Co. .....Philadelphia.

METAL POLISH.

Bertram's Oil Polish Co.....Boston.

MOTORS, GENERATORS—ELECTRIC.

Elwell-Parker Electric Co.....Cleveland.
General Electric Co.....Schenectady, N. Y.
Sturtevant, B. F. Co.....Boston
Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

NAUTICAL INSTRUMENTS.

Bliss, John & Co. .....New York.
Ritchie, E. S. & Sons .....Brookline, Mass.

NAUTICAL SCHOOLS.

Chicago Nautical School..... Chicago.
Seattle Nautical School .....Seattle, Wash.

NAVAL ARCHITECTS.

Gaskin, Edward .....Buffalo.
Kidd, Joseph ..... Duluth, Minn.
Logan, Robert ..... Cleveland.
Matteson & Drake.....Philadelphia.
Mosher, Chas. D.....New York.
Newman, R. L. ..... New York.
Sadler, Perkins & Field .....New York.
Wood, W. J. .....Chicago.

OAKUM.

DeGrauw, Aymar & Co. .....New York.
Stratford Oakum Co. .....Jersey City, N. J.

OIL FOR PAINTING.

Sipe & Co., James B.....Allegheny, Pa.

OILS AND LUBRICANTS.

Dixon Crucible Co., Joseph .....Jersey City, N. J.
Standard Oil Co. .....Cleveland.
United States Graphite Co ..... Saginaw, Mich.

PACKING.

Crane Co. .....Chicago.
Hayden Mfg. Co., N. L. .....Columbus, O.
Jenkins Bros. .....New York.
Katzenstein, L. & Co. .....New York.
New York Belting & Packing Co. .....New York.
United States Metallic Packing Co...Philadelphia.

PAINTS.

Baker, Howard H. & Co.....Buffalo.
Detroit Varnish Co. .....Detroit.
Detroit White Lead Works .....Detroit.
Mohawk Paint & Chemical Co.....Norwich, Conn.
New Jersey Zinc Co. .....New York.
Sipe & Co., James B.....Allegheny, Pa.
United States Graphite Co.....Saginaw, Mich.
Upson-Walton Co. .....Cleveland.

PATENT ATTORNEYS.

Thurston & Bates .....Cleveland.

PATTERN SHOP MACHINERY.

Atlantic Works, Inc. .....Philadelphia.

PIPE-JOINT COMPOUND.

United States Graphite Co.....Saginaw, Mich.

PIPE, WROUGHT IRON.

Bourne-Fuller Co. .....Cleveland.
Crane Co. .....Chicago.
Macbeth Iron Co.....Cleveland.

PLANING MILL MACHINERY.

Atlantic Works, Inc. .....Philadelphia.

PLATES—SHIP, STRUCTURAL, ETC.

Bourne-Fuller Co..... Cleveland.

PLUMBING, MARINE.

Reilly Repair & Supply Co., James....New York.
Sands, Alfred B. & Son.....New York.

PNEUMATIC TOOLS.

Allen, John F. .....New York.

POLISH FOR METALS.

Bertram's Oil Polish Co.....Boston.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

PRESSURE REGULATORS.

Kieley & Mueller .....New York.
Ross Valve Co. .....Troy, N. Y.

PROPELLER WHEELS.

American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Bath Iron Works, Ltd.....Bath, Me.
Cramp, Wm. & Sons.....Philadelphia.
Crescent Ship Yard Co.....Elizabethport, N. J.
Detroit Ship Building Co.....Detroit.
Fore River Ship & Engine Co.....Quincy, Mass.
Great Lakes Engineering Works.....Detroit.
Hyde Windlass Co. .....Bath, Me.
Jenks Ship Building Co.....Port Huron, Mich.
Lockwood Mfg. Co.....East Boston, Mass.
Macbeth Iron Co.....Cleveland.
Maryland Steel Co.....Sparrow's Point, Md.
Milwaukee Dry Dock Co.....Milwaukee.
Moran Bros. Co.....Seattle, Wash.
Newport News Ship Building Co Newport News, Va.
Phosphor Bronze Smelting Co., Ltd. ..Philadelphia.
Risdon Iron Works.....San Francisco.
Roelker, H. B. .....New York.
Sheriffs Mfg. Co. .....Milwaukee.
Superior Shipbuilding Co .....Superior, Wis.
Thropp & Sons Co., J. E. .....Trenton, N. J.
Trout, H. G. .....Buffalo.
United States Ship Building Co.....New York.

PROJECTORS, ELECTRIC.

Elwell-Parker Electric Co.....Cleveland.
General Electric Co.....Schenectady, N. Y.
Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

PUMPS FOR VARIOUS PURPOSES.

Blake, Geo. F., Mfg. Co.....New York.
Great Lakes Engineering Works.....Detroit.
Kingsford Foundry & Machine Wks. Oswego, N. Y.
"Long-Arm" System Co.....Cleveland.

PUNCHES, RIVETERS, SHEARS.

Allen, John F.....New York.

RANGES.

Russell & Watson .....Buffalo.
Siegel Cooper Co.....New York.

REFRIGERATING APPARATUS.

Roelker, H. B. .....New York.

REGISTER FOR CLASSIFICATION OF VESSELS.

Great Lakes Register .....Cleveland
Record of American & Foreign Shipping.New York.

RIVETING MACHINES.

Allen, John F.....New York.

RIVETS, STEEL, FOR SHIPS AND BOILERS.

Bourne-Fuller Co. .....Cleveland.

SAFETY VALVES.

American Steam Gauge Co. .....Boston.
Ashton Valve Co. .....Boston.
Crane Co .....Chicago
Hayden Mfg. Co., N. L. .....Columbus, O.
Lunkenheimer Co.....Cincinnati.

SAIL MAKERS.

Baker, Howard H. & Co. .....Buffalo.
Upson-Walton Co. .....Cleveland.
Wilson & Silsby .....Boston.

SALVAGE COMPANIES.

See Wrecking Companies.

SCHOOLS, NAUTICAL.

Chicago Nautical School.....Chicago.
Seattle Nautical School .....Seattle, Wash.

SEARCH LIGHTS.

Elwell-Parker Electric Co.....Cleveland.
General Electric Co.....Schenectady, N. Y.
Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

SHEARS.

See Punches, Rivets, and Shears.

SHIP AND BOILER PLATES AND SHAPES.

Bourne-Fuller Co. .....Cleveland.

SHIP BUILDERS.

American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Bath Iron Works, Ltd.....Bath, Me.
Buffalo Dry Dock Co.....Buffalo.
Cramp, Wm. & Sons.....Philadelphia.
Craig Ship Building Co.....Toledo, O.
Chicago Ship Building Co.....Chicago.
Crescent Ship Yard Co.....Elizabethport, N. J.
Detroit Ship Building Co. .....Detroit.
Fore River Ship & Engine Co. .....Quincy, Mass.
Great Lakes Engineering Works.....Detroit.
Jenks Ship Building Co.....Port Huron, Mich.
Lockwood Mfg. Co.....East Boston, Mass.
Manitowoc Dry Dock Co. .....Manitowoc, Wis.
Marine Construction & Dry Dock Co.....
.....Mariner's Harbor, S. I., N. Y.
Maryland Steel Co.....Sparrow's Point, Md.
Milwaukee Dry Dock Co.....Milwaukee.
Moran Bros. Co.....Seattle, Wash.
Newport News Ship Building Co Newport News, Va.
Risdon Iron Works.....San Francisco.
Roach's Ship Yard .....Chester, Pa.
Shipowners Dry Dock Co. .....Chicago.
Smith & Son, Abram .....Algonac, Mich.
United States Ship Building Co.....New York.
Warrington Iron Works.....Chicago.
Willard, Chas. P. & Co.....Chicago.

SHIP CHANDLERS.

Baker, Howard H. & Co. .....Buffalo.
Moran Bros. Co.....Seattle, Wash.
Reilly Repair & Supply Co., James....New York.
Upson-Walton Co. .....Cleveland.

SHIP LANTERNS AND LAMPS.

Helvig, H. A. J. .....New York.
Russell & Watson .....Buffalo.

SHIP TIMBER.

Martin-Barriss Co. .....Cleveland.
Moran Bros. Co.....Seattle, Wash.
Shurick, F. S. ..... New York.

SMOOTH-ON COMPOUND, FOR REPAIRS.

Smooth-On Mfg. Co. .....Jersey City, N. J.

SPARS—LARGE SIZES.

Moran Bros. Co.....Seattle, Wash.

STAYBOLTS, IRON OR STEEL, HOLLOW, OR, SOLID.

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

STEAM VESSELS FOR SALE.

Elwell, Jas. W. & Co. .....New York.
Holmes, Samuel .....New York.
King, Rufus S. .....New York.
McCarthy, T. R. .....Montreal, Can.
Newman, R. L. .....New York.
Weeks, F. H. .....New York.

STEAMSHIP LINES, PASS. AND FREIGHT.

American Line .....New York.
Erie & Western Trans. Co. .....Buffalo.
Goodrich Trans. Co. .....Chicago.
International Mercantile Marine Co .. Philadelphia.
Pere Marquette R. R. & S. S. Line.....Milwaukee.
Red Star Line .....New York.

STEEL CASTINGS.

Seaboard Steel Casting Co. .....Chester, Pa.
Macbeth Iron Co.....Cleveland.

STEERING APPARATUS.

American Ship Building Co.....Cleveland.
Chase Machine Co.....Cleveland.
Dake Engine Co. .....Grand Haven, Mich.
Detroit Ship Building Co.....Detroit.
Hyde Windlass Co. .....Bath, Me.
Jenks Ship Building Co.....Port Huron, Mich.
Moulton Steering Engine Co..... ....New York.
Sheriffs Mfg. Co. .....Milwaukee.

STOCKS, BONDS, SECURITIES.

Fahey & Co. .....Cleveland.

SUBMARINE DIVING APPARATUS.

Morse & Son, A. J. .....Boston.
Schrader's Son, A. .....New York.

SURVEYORS, MARINE.

Gaskin, Edward .....Buffalo.
Matteson & Drake ... .Philadelphia.
Newman, R. L. .....New York.
Wood, W. J. .....Chicago.

TESTS OF MATERIALS.

Hunt, Robert W. & Co. .....Chicago.
Pittsburg Testing Laboratory Ltd. .....Pittsburg.

TILING, INTERLOCKING RUBBER.

New York Belting & Packing Co. .....New York.

TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.

Allen, John F. .....New York.
Watson-Stillman Co. .....New York.

TOOLS, WOOD WORKING.

Atlantic Works, Inc. .....Philadelphia.

TOWING MACHINES.

American Ship Windlass Co.....Providence, R. I.
Chase Machine Co. .....Cleveland.

TOWING COMPANIES.

Donnelly Salvage & Wrecking Co....Kingston, Ont.
Midland Towing & Wrecking Co., Ltd.Midland, Ont.

TRAPS, STEAM.

Kieley & Mueller .....New York.
Lunkenheimer Co. ..... Cincinnati.
Sturtevant Co., B F, Jamaica Plain. .....Boston.

TRUCKS.

Boston & Lockport Block Co. .....Boston.

TUBING, SEAMLESS.

Shelby Steel Tube Co. .....Pittsburg, Pa.

VALVES, STEAM SPECIALTIES, ETC.

American Steam Gauge Co. .....Boston.
Ashton Valve Co. .....Boston.
Bordo, L. J. .....Philadelphia.
Crane Co. .....Chicago.
Hayden Mfg. Co., N. L. .....Columbus, O.
Jenkins Bros. .....New York.
Kieley & Mueller .....New York.
Lunkenheimer Co. ..... Cincinnati.
Ross Valve Co. .....Troy, N. Y.

VALVES FOR WATER AND GAS.

Ross Valve Co. .....Troy, N. Y.

VARNISHES.

Detroit Varnish Co..... Detroit.
Detroit White Lead Works..... Detroit.
New Jersey Zinc Co.....New York.
Also Ship Chandlers.

VESSEL AND FREIGHT AGENTS.

Boland, John J. .....Buffalo.
Brown & Co. .....Buffalo.
Elwell, Jas. W. & Co. .....New York.
Elphicke, C. W. & Co. .....Chicago.
Fleming & Co., P. H. .....Chicago.
Hall & Root .....Buffalo.
Helm & Co., D. T.....Duluth.
Hawgood & Co., W. A. .....Cleveland.
Holmes, Samuel .....New York.
Hutchinson & Co. .....Cleveland.
King, Rufus S. .....New York.
McCarthy, T. R. .....Montreal.
Newman, R. L.....New York.
Mitchell & Co. ..... Cleveland
Richardson, W. C. .....Cleveland.
Sullivan, D. & Co. .....Chicago.
Weeks, F. H. .....New York.

VENTILATING APPARATUS FOR SHIPS.

Sturtevant, B. F. Co. .....Boston.

VESSEL FURNISHINGS.

Siegel Cooper Co .....New York.

WIRE ROPE AND WIRE ROPE FITTINGS.

Baker, H. H. & Co. .....Buffalo.
DeGrauw, Aymar & Co. .....New York.
Upson-Walton Co. .....Cleveland.

WHISTLES, STEAM.

American Steam Gauge Co. .....Boston.
Ashton Valve Co. .....Boston.
Lunkenheimer Co. ..... Cincinnati.

WINDLASSES.

American Ship Windlass Co.....Providence, R. I.
American Ship Building Co. .....Cleveland.
Hyde Windlass Co. .....Bath, Me.
Jenks Ship Building Co. .....Port Huron, Mich.

WINCHES.

American Ship Windlass Co.....Providence, R. I.
Hyde Windlass Co. .....Bath, Me.

WOOD WORKING MACHINERY.

Atlantic Works, Inc. .....Philadelphia.

WRECKING AND SALVAGE COMPANIES.

Donnelly Salvage & Wrecking Co...Kingston, Ont.
Midland Towing & Wrecking Co., Ltd..Midland, Ont.

YACHT AND BOAT BUILDERS.

Drein, Thos. & Son .....Wilmington, Del.
Lane & DeGroot .....Long Island City, N. Y.
Marine Construction & Dry Dock Co.....New York.
Ripley Hardware Co..... Grafton, Ill.
Truscott Boat Mfg. Co.....St. Joseph, Mich.
Warrington Iron Works.....Chicago.
Willard, Chas. P. & Co.....Chicago.

YAWLS.

Drein, Thos. & Son .....Wilmington, Del.
Lane & DeGroot.....Long Island City, N. Y.

ALPHABETICAL INDEX OF ADVERTISERS IN THE MARINE REVIEW AND MARINE RECORD.

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